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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION.

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The Registered Office and Laboratories of the B.C.I.R.A. are at:—
24, ST. PAUL'S SQUARE, BIRMINGHAM.
Telephone: Central 1885. Telegrams: CIRA.
The B.C.I.R.A. Scottish Laboratories are:—
Foundry Technical Institute, Meek's Road, Falkirk *(Telephone 332).*

Forthcoming Events.

MARCH 3.
Institute of Metals (Birmingham Local Section):—Ordinary meeting. "Gases in Metals," Paper by S. L. Archbutt.

MARCH 4.
Institute of Metals (Sheffield Local Section):—Ordinary meeting. "Defects in Spoon and Fork Blanks," Paper by W. R. Barclay, O.B.E.

MARCH 8.
Institute of Metals (Swansea Local Section):—Annual general meeting. "Metallography in Industry," Paper by Roosevelt Griffiths, M.Sc.

MARCH 9-10.
Institute of Metals:—24th annual general meeting, and annual dinner, in London.

MARCH 10.
Institution of Welding Engineers:—Ordinary meeting in London. "High-Speed Arc Welding," Paper by J. H. Paterson, D.Sc., F.I.C.

MARCH 11.
Manchester Association of Engineers:—Ordinary meeting. "Properties of Steel as affected by Increase of Temperature," Paper by W. H. Hatfield, D.Met.

MARCH 14.
Institution of Mechanical Engineers:—Annual lecture in London. "The Strength and Behaviour of Steels at High Temperatures," by W. H. Hatfield, D.Met., M.I.Mech.E.

Institute of British Foundrymen.

MARCH 5.
Lancashire Branch:—Ordinary meeting at Manchester. "Some Notes on the Centrifugal Casting Process," Paper by J. E. Hurst.

MARCH 10.
Lancashire Branch (Burnley Section):—Annual general meeting. Paper to be read by J. Jackson.

MARCH 11.
Middlesbrough Branch:—Ordinary meeting at the Cleveland Scientific and Technical Institute.

MARCH 12.
West Riding of Yorkshire Branch:—Visit to works of Messrs. Thomas Broadbent & Sons, Limited, Huddersfield.

National Physical Laboratory.

The name of Dr. Rosenhain, whose resignation from the National Physical Laboratory was recently announced, is so completely identified with the Metallurgical Department there that it will be difficult to conceive him without it, and it without him. We so often have to admit the superiority of certain foreign countries in research that it should give us particular pride to recognise that in the sphere of metallurgical research no institution in the world can equal our own national organisation at Teddington.

We understand, however, that Dr. C. H. Desch, F.R.S., Professor of Metallurgy at the University of Sheffield, who was announced some time ago as Dr. Rosenhain's successor, has now taken up his duties, and we are certain that the metallurgical world considers the Laboratory fortunate in having secured his services.

The problem of the programme of work to be undertaken at a national laboratory, such as the N.P.L., is one which must give cause for continuous thought to the executive committee. In part, of course, the Laboratory is occupied with many matters relating both to routine tests and to research which are called for, and paid for, by industry. There remains, however, a considerable proportion which is either undertaken at the direct request of various Government Departments (particularly the Air Ministry), or which is undertaken by the authorities because it is necessary and desirable in the wider interests of industry. We do not think it desirable that particular items on this programme should be put forward or modified in any way by purely industrial interests. It is obviously desirable that a balance should be maintained. In this connection, however, we have often thought that the founder is a citizen and a taxpayer, and that some part of the programme might well be devoted to the study of the material in which he is interested. There is every scientific reason for so doing, and it must not be forgotten that, with a few minor exceptions, all metals originally exist in the cast state, and the characteristics they assume in this state persist in some cases through all subsequent processes. We are aware that the study of cast metals is a difficult one, and that as far as cast iron is concerned probably no metallurgist would choose it voluntarily as a sphere of investigation. This, however, makes it all the more desirable that the material should receive its share of attention at a national institution, because the difficulties referred to tend to prevent it being studied at the Universities as fully as the comparatively simpler materials—the non-ferrous metals and the steels—on which much still has to be done.

We are confident that the new superintendent can be relied upon to see that this field of work shall receive its due share of attention.

Routine Chemist or Industrial Development Officer?

In times such as the present it behoves every owner of a business or board of directors to throw a powerful searchlight on every branch of their firm's activities. That this is being done we are fully aware, but we also know that in many cases the laboratory is only given a cursory glance and dismissed as a necessary evil. Such a short-sighted attitude is as utterly wrong as it is astonishingly prevalent. It is to labour the obvious to state that modern foundry practice is entirely the result of scientific research and it is equally true that industry cannot progress one step further without it. No firm can remain static—it must be progressive if it is to hold its own, and it follows that its laboratory must be in the van of its progress. We know of a number of clever works chemists carrying out their duties in inadequate laboratories poked away in an odd corner of the works, doing only routine work, who could serve their firms and the industry far better if they were recognised as live industrial development officers rather than just the "men who analyse things." Every chemist should be sufficiently relieved of routine work to devote part of every day to research and its application, and the management should take a lively interest in his work.

Another prevalent idea is that a chemist's sphere of activity is bounded by the four walls of his laboratory. Actually he cannot be too widely travelled if he is to obtain the knowledge which is to be gained from contact with those engaged in businesses related to his own. In the course of affairs there are very many occasions when it is necessary for someone to visit the works of suppliers of material, or consumers of one's own products to discuss technical or semi-technical points. On all such occasions the

(Concluded on next page.)

Notes from I.B.F. Branches.

Lincolnshire.—The Lincolnshire Section of the Institute of British Foundrymen held a meeting at Lincoln Technical College last month. The lecturer was Mr. A. E. Musgrave, who apologised for not presenting the advertised lecture on "Balancing the Elements." He had sustained an unfortunate accident that had confined him to his room for five months, and he had been unable to collect the data for his lecture. He therefore had substituted his Paper on "The Romance of Iron and Steel."

Mr. Musgrave referred to the art of working metals from the year 3500 B.C. to the present day, and his Paper was profusely illustrated by lantern slides. The first-known metal to be worked was gold, and an illustration of an Egyptian mural painting from the frescoes of the Beni-Hassan (2500 B.C.) depicted the melting of the metal in a roughly-formed crucible, the blast being provided by man with the aid of a mouth-blown tube. A similar illustration, dated 1500 B.C., showed the first type of mechanical blast for melting purposes. The bellows were of hide, in the centre of which was a hole that could be closed by the foot of the operator, thus forming a valve. The bellows were reinflated after each stroke by the pulling of a cord in the worker's hand, attached to the hide. Furnaces of this type were used at that period for the melting of bronze, which was used for the making of tools and weapons, the moulds being of the permanent type, hewn in stone.

This brought the question of when and how iron was discovered. Iron was mentioned in ancient writings associated with the Pyramids as far back as 2750 B.C., the word used being "Bia-n-pet," meaning "metal of heaven." A much later inscription refers to "Bia-n-ta," meaning "metal of earth." This has led to the conclusion that the first iron used was of meteoric origin, and accounts for the finding of tools of very remote periods long before the extraction of iron from ore became general. A number of illustrations followed showing the evolution of the blast furnace.

Mr. Musgrave made reference to the interesting discovery at Colsterworth, Lincolnshire, a few weeks ago, of a small Roman melting furnace practically intact. The lecturer had several slides and photographs of this furnace, and also exhibited specimens of the slag taken from the furnace bottom. Constructed of baked clay, it was in the form of a rectangular box, about 2 ft. 6 in. in length, with tuyere openings in the side for the blast. Provision was made for the introduction of the ore and charcoal at one end of the furnace and for the withdrawing of the reduced metal at the other end. There was also a number of holes in the roof of the furnace, which were found to be covered with fragments of Roman pottery. It was not until the 12th century that any further development in Europe could be traced, when the Catalan forge came into being at Catalonia, in Spain. The blast was supplied by an induced current apparatus, known as the Trompe, and was worked by water from a mountain stream. The Catalan forge was still in use in 1834.

Mr. Musgrave then traced the smelting of iron ore to the present-day blast furnace and the modern pig-casting machine. The author also dealt with the manufacture of steel and illustrated the process and advancement in the Bessemer converters. Two very interesting slides were taken from actual pages of the diary of James Nasmyth, the first showing his original design of the steam hammer, and the second being the modern geared foundry ladle. In connection with the latter, Mr. Musgrave mentioned that, while foundrymen generally had adopted the invention of the geared ladle by Nasmyth, he thought that we had not taken sufficient notice of the skimming device illustrated.

Mr. Musgrave concluded with the following statement taken from the "London Illustrated News" of 1856, in which the invention of Henry Bessemer was first announced:—"Well has it been said that the history of iron is the history of civilisation. Deprived of iron and its derivative steel, the arts of war no less than the arts of peace would dwindle into insignificance or be utterly extinguished. Mankind would sink into primeval barbarism. There would be positively no substitute for it as regards by far the majority of purposes to which it is applied."

The Chairman, Mr. J. J. Feasey, thanked the lecturer for his address, on the proposal of Mr. Gale, seconded by Mr. Stone.

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

"Price Per Cwt."

To the Editor of The Foundry Trade Journal.

Sir,—The article by "Practicien," "Price Per Cwt.," in your issue of the 11th inst, exposes a fallacy of which most ironfounders are aware, and which I do not wish to comment upon.

I was more interested in the system of costing adopted, and consider that the rates of 2s. 3d., 4s. 3d. and 2s. 6d., per hr. charged respectively for patternmakers, moulders and coremakers are not consistent and are not sufficiently correct for estimating purposes.

I gather that all overhead items, all non-productive labour and the profit are covered by these three charging rates, and fail to see what justification there is for coremakers being charged for at a little more than half the charge for a moulder.

He uses up a larger proportion of new sand than does a moulder, he needs almost as much unskilled labour, his cores require to be removed from the casting by fettlers, and I see no reason why overhead charges on a coremaker should be any lower than on a moulder.

By this system I imagine that all plain work which requires no cores will be estimated at too high a cost, and that intricately-cored work will be estimated too low; and thus the tendency will be for a large proportion of unprofitable work to be obtained.

The question of accurate costing is so important to the industry that I think a system such as is here detailed should not pass unchallenged.—Yours, etc.,

S. H. Russell.

Bath Lane,
Leicester.
February 29, 1932.

Routine Chemist or Industrial Development Officer?

(Concluded from previous page.)

works chemist should be present, not only to deal with the point at issue but to receive every impression he can on any subject which may be of use to him in his investigational and development work.

Finally, he ought to be encouraged to join scientific institutions such as the Institute of British Foundrymen, the Institute of Metals and the Iron and Steel Institute, where he will find every opportunity to discuss a variety of topics bearing on his everyday work. The meetings of the local branches of the two first-named Institutes are held monthly, and if a chemist is sufficiently keen on his work to devote part of his leisure to acquiring knowledge to be used in his firm's interest, the least that firm can do is to see to it that no financial consideration prevents that man's membership and attendance. Chemists generally are not millionaires, and we know of cases of keen men to whom the annual subscriptions plus incidental expenses incurred in attending periodic scientific lectures is a barrier which prevents them from that access to knowledge which should be theirs.

Random Shots.

In view of the bitterly cold wind last Tuesday, "Marksman" was not altogether sorry that he could not travel to Castle Bromwich for the Institute of British Foundrymen's official visit. He trusts, however, that the officials provided you all with portable coke braziers. Something like that was needed! By the way, the B.I.F. catalogue gives rather an unusual spelling of "ferrous" and "non-ferrous," for both contain an extra "e." The Fair always manages to include something original each year, doesn't it?

* * *

A meeting of the wholly imaginary International Association of Famous Founders was held last week in Paris. There were many distinguished speakers present, including "Marksman," Tubal Cain, Wilkinson, "Marksman," Benvenuto Cellini, Réaumur and Alfred, the original foundry foreman. Oh, and "Marksman" was also present. Miss Nellie Snookers presided.

* * *

The object of this meeting, I ought to explain, was to consider the future of the foundry industry in the light of the past. That explains why so many representatives of the past attended. Unfortunately, the convener was not quite sure whom to invite to represent the future, so that it was decided to let the future look after itself. No one objected to this decision.

* * *

The results of the meeting cannot be described as very successful. It became clearly apparent that so much progress had been made in the last half century that the past could not be considered as a satisfactory gauge of the future of the industry. Naturally, Tubal Cain and others were inclined to disagree with this view. The discussion was finally abandoned. Alfred was called upon to present his Paper on "Pipe Moulding in a Jobbing Foundry." The discussion on the Paper centred around the best means of getting the metal good and hot, and Mr. Wilkinson was called upon to answer many questions in connection with cupola practice. At the next meeting of the I.A.F.F. Mr. Benvenuto Cellini has been invited to present a Paper on mechanical handling as applied to the mass-production of radiator mascots.

* * *

"Can ye not tell me how to prevent this?" asked the sea-sick Scot of the ship's steward.

"Hae ye a saxpence?"

"Aye!"

"Well, haud it between your teeth."

* * *

"What's this chicken liquor you're all talking about?" asked one American of another.

"Oh, just one drink and there you lay" was the answer.

"Marksman."

A New Technical College for London.

Last Friday, Sir John Gilbert, K.B.E., chairman of the Education Committee of the London County Council, opened the South-East London Technical Institute at Lewisham High Road, S.E.4. Sir John Prestige, a director of J. Stone & Company, Limited, presided.

The Principal, Mr. G. Robinson, B.Sc., is particularly keen on foundry practice and has included in his equipment an excellent pattern shop, well supplied with the latest Wadkin machinery, and a moulding shop, in which melting is carried out in pit fires. Amongst those present at the opening ceremony were Dr. Morley, Mr. G. C. Pierce (Past-President of the London Section of the Institute of British Foundrymen) and Mr. Vincent C. Faulkner (Editor of The Foundry Trade Journal).

A Novel Core-Shop Tool.

A WEST COUNTRY FOUNDRY DEVELOPMENT.

During a tour in the West Country, we called on Messrs. Newman, Hender & Company, Limited, Woodchester, Gloucester, who, as manufacturers of valves, cocks, steam and water fittings, possess a large and modern foundry, necessitating the provision of extremely large quantities of accurately finished cores. The foundry, in both its iron and non-ferrous sections, utilises machine moulding to a maximum, and for the larger machines has adopted the system of projecting prepared sand through a culvert to storage bins situated directly above each machine. By insisting that the moulding boxes and other tackle are conveniently placed for easy handling by the operator, this does constitute an economical system of working, and possesses the great advantage of elasticity, as any unit can be cut off without loss of efficiency in the provisioning of those still at work.

For a foundry of this character, money is made or lost in the core shop, and it is to this section the management has devoted the maximum amount of attention to reduce unnecessary expenditure. In common with other West Country foundries, normally they use Mansfield sand, mixed with a suitable core compound, as a base. By doing so they can, for most jobs make a core which is so strong in its green state as to eliminate the use of carrier trays. Moreover, we were assured that cores so made never distort during baking, a factor of the highest importance in relation to rejects due to sectional discrepancies in the finished castings. Whilst many cores are made by hand, core-blowing machines have been installed. One of these is extremely rapid in action, and does the work of eight girls, but for its operation a silica sand has to be used in conjunction with the use of carrier trays. In testing the relative transverse strength of the cores made from red and silica sand, we were convinced that the former were really infinitely stronger. Another machine in use has replaced about four girl core-makers, and it can, and does, use the normal red-sand mixture in general use in the core shop.

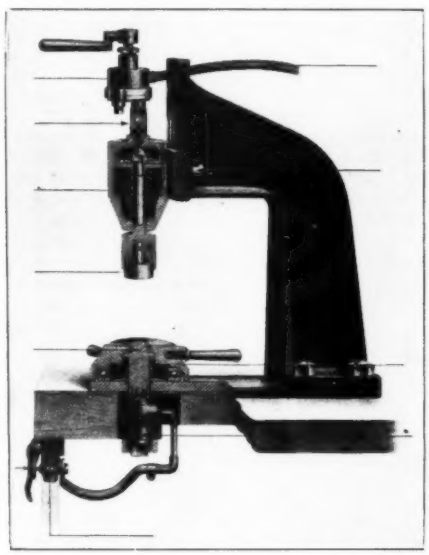

Fig. 1.—The "Newman" Air-operated Core-box Vice.

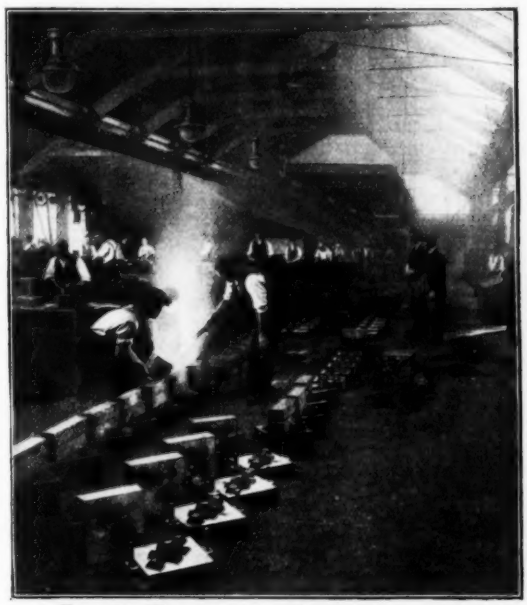

Fig. 3.—View in the Foundry, Newman, Hender & Company, Limited.

Fig. 2.—A Corner of the Core Shop, Newman, Hender & Company, Limited.

Introduction of the "Newman" Corebox Vice.

From the above statements it will be realised that much study has been given to the economic production of cores in a core shop which normally employs a matter of 50 employees, and it was realised that much-needed improvements were desirable in the equipment for the every-day production of cores. For instance, costs showed that the item for upkeep of core-boxes was excessive, although they were manufactured in a hard-wearing alloy. Yet the continual hammering seriously reduced their working life. Moreover, the turning and twisting of boxes by hand had its ill-effect on output, whilst distortions and overlaps in the cores due to loose dowels (caused by hammering the boxes) invariably swell costs in every department —patternmaking, coremaking, moulding, fettling and machining. So impressed was the management with the potential savings that it designed and has now placed upon the market through the Coleman Foundry Equipment Company, Limited, of 14, Southampton Street, London, W.C.2, a patented air-operated core-box vice, shown in Fig. 1. As will be seen, it is simple in construction and merely consists of an open-sided frame, to the upper portion of which the air vice is attached. This vice is lowered by admitting compressed air into a cylinder, containing a spring for the return of the piston. In order that the downward stroke may be suited to various types of core-boxes, an air-(piston speed) control valve has been incorporated. The presser head rotates on ball bearings and is readily detachable. This portion of the machine is adjustable as to height through a

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Institute of British Foundrymen.

BIRMINGHAM BRANCH ANNUAL DINNER.

The annual dinner of the Birmingham, Coventry and West Midlands Branch of the Institute of British Foundrymen was held last month at the Imperial Hotel, Birmingham. Mr. F. J. Hemming (Branch-President) was in the chair, and the guests included Mr. Andrew Harley (President of the Institute), Mr. R. P. Bethell (President of the South Staffordshire Iron and Steel Institute) and Mr. T. Makemson (General Secretary of the Institute).

Institute and the Industry.

Mr. R. P. Bethell submitted the toast of the Institute of British Foundrymen. He understood, he said, that the Institute had now had 28 years' existence, while the membership was about 2,000. During the life of the Institute the foundry industry had undergone remarkable changes along with the other branches of engineering. The foundry was the most recent of the old arts and crafts to submit to the innovations of modern mechanised production and scientific control. The former would have a tough proposition with regard to some castings, which called for the utmost ingenuity and skill of experienced moulders, while as to scientific control, the industry readily used the knowledge available to improve quality and increase production. Changes in the industry were reflected in the quality of the Papers presented to the Institute for discussion. They were highly specialised and covered many phases of metallurgy and practice. The membership also showed the diversity of activities, ranging from moulders and apprentices to foundry engineers and metallurgists, foundry owners and those engaged in developing the foundryman's raw materials and equipment. He was one of the poor beings who had something to do with the preparation of the foundryman's raw materials. It seemed to him that foundrymen were very prone to blame the blast-furnaceman for all the ills the foundryman was heir to (Laughter). Such a wide range of members, all co-operating and carrying out the terms of the Institute's Royal Charter, spoke well for the present soundness and future prosperity of the British foundry industry. The Institute was to be congratulated on the successful establishment of the educational scheme which it had formulated. A national certificate in ironfounding for the young would-be foundry executive, and a craft certificate for the apprentice moulder and patternmaker would very soon become the recognised hall marks of foundry training. The annual conference was a very valuable and popular feature of the Institute's work, and the results of the last conference must have amply justified the efforts of those responsible for its organisation. The local foundries and engineering works opened their doors to the Institute's members, and the value and esteem in which the Institute was held by the remainder of the community was reflected in the generous co-operation of the civic authorities of Birmingham and Coventry. The Institute had been very fortunate in its selection of Presidents. Many able men of wide experience had passed through the Presidential chair and had worthily upheld the dignity of the office. Glancing through the list of Past-Presidents, he noticed a fair sprinkling of Scotsmen among them. Their present President, who was with them that evening, was proud to claim more than a passing acquaintance with the land o' cakes. Like many more north countrymen he had gravitated southward and finally settled in the Midlands, where he had endeared himself to all those with whom he had come in contact. Mr. Harley had been a member of the Institute for 22 years, and taken an active part in its management for many years past. His election as President was a fitting acknowledgment of the work he had carried out. The Institute was, indeed, fortunate in having as its President this year Mr. Harley, who came from a family long connected with the foundry industry. (Applause.)

Problem of Economists.

Mr. Andrew Harley, in responding, said the value of his long connection with the Institute was best expressed in terms of friendship. He did not think he was claiming too much when he said that foundrymen were by nature good fellows. He did not think that, as a rule, they were peevish or quarrelsome. They were carrying on in their daily life a very difficult and trying occupation; very serious problems met them every day, and he thought this begot that calm, philosophic temperament. He was rather tired of hearing references to the necessity of developing our technical efficiency. He realised that many improvements could be made in our methods, and were being made. But, after all, taking a broad view, the production of the commodities of life had been perfected to a miraculous extent. With our equipment, science and gift for invention, it ought to be possible for everybody to be supplied with the comforts that made life happy. Yet it was not so. Why? That was the problem, and the sooner it was solved the better. It was not an industrialists' problem; they were doing their part. It seemed to be a problem for the economist. We were passing through a difficult time, but the more difficult the situation, the more it hastened the solution of problems, and he hoped it would be so in the present case. In spite of the existing anxious times, the Institute had never shown more life and vitality. During the past year three new Branches or sub-sections had been started, at Lincoln, Preston and Edinburgh. That showed the Institute was not standing still, but going forward; it showed also that foundrymen were anxious to perfect themselves in their craft.

Presentation to Mr. F. K. Neath.

Mr. Harley concluded by handing to Mr. F. K. Neath, hon. secretary of the Birmingham Branch, a handsome silver cigarette box bearing the following inscription:—"Presented to F. K. Neath in recognition of his services as Honorary Secretary of the 28th Annual Conference of the Institute of British Foundrymen, held at Birmingham, June, 1931." Mr. Harley added that with the gift went their warmest feelings of friendship for Mr. Neath.

Speaking in acknowledgment of the gift, Mr. Neath said the Conference was a success, and he thought the Birmingham and Coventry districts, and the foundrymen therein, were entitled to be proud of the way in which the industry responded by opening their works and supplying the necessary funds; also by turning up in such numbers that the Conference was a record for a Conference other than a London International Conference.

The toast of "The Visitors" was proposed by the Chairman. In doing so he commented on the condition of the foundry industry and the evolution that was taking place. At the present time, he said, we were in the process of changing from one fiscal policy to another, and while, as a trade, they could not disguise the fact that they were under a serious cloud of depression, he believed that out of that depression something would arise which would improve the status of the whole foundry industry. They had a splendid lot of men in the industry, and he thought that, as a result of their meetings together, they would become more closely associated commercially and work out a protection within the trade, with the consequence that they would avoid the lowering of the standard of existence of men in the trade. Unless foundrymen could nationalise in some shape or form the standard of life must decline among the men engaged in it. In castings, they had a very high wages factor, and it was up to all of them to protect that wages factor to the utmost of their ability. The chairman mentioned with regret the absence of Mr. Flavell, who, he said, was seriously ill. Mr. Flavell had not missed the dinner for many years, and with the accord of those present he would ask the secretary to send Mr. Flavell in their name a message of sympathy. (Hear, hear.)

Mrs. F. J. Hemming, in replying on behalf of the ladies, said housekeepers would be in a pitiable position if they had no one to make their ovens, boilers and other household requirements. At a time when foundrymen were passing through so many difficulties and anxieties in their daily work, she would like to assure them that women appreciated their efforts and achievements. (Applause.)

Technical Education.

Mr. T. Makemson, who also responded, alluded to the Institute's activities, and in particular to the craft certificate scheme launched last year, and which was now completing its first session's work. They would be glad to know, he said, that there were 24 colleges and schools in various parts of the country which were conducting schedule classes and preparing students for the City of Guilds examinations. In addition, about 30 applications had been received from isolated students for permission to sit for the examination as external candidates. That, he thought, they would agree, was an encouraging start, because it had been a truism for many years that, whereas apprentices in most branches of engineering quite normally and naturally took up technical education, apprentices in the foundry had been generally very backward, and only a small percentage attended classes or worried about the technical side of their craft. He believed there had been started what was a revolution in the attitude of technical training of foundry apprentices. Next year he believed they would have more classes and more students. They hoped that in the course of not very many years the whole attitude of the foundry apprentice to technical training would have undergone a total change. Better boys would be attracted into the trade, which could have nothing but the most beneficial results. The foundry to-day was demanding a different type of personnel from the foundry industry of the past, and he thought they could feel quite sure that the type of personnel required would be forthcoming. The scheme which the Institute had sponsored, and in which they had been assisted by the British Cast Iron Research Association and other organisations, was going to play a by no means unimportant part in bringing about the required type of personnel. During the past year the Birmingham Branch had had an extremely successful experience. The membership had increased and the Branch had more than balanced its budget. He trusted the progress would continue. (Applause.)

The proceedings were enlivened by an interesting programme of music.

B.S. Specification for Cast-Iron Spigot and Socket Drain Pipes.—The British Standards Institution has issued a Specification (No. 437—1932) for cast-iron drain pipes. It provides for straight pipes only in standard lengths of 9 ft. exclusive of the depth of socket. Copies of this Specification may be obtained from the Institution's Publication Department, 28, Victoria Street, London, S.W.1, Price 2s. 2d. post free.

Sandslinging Practice in the Foundry.

In our issue of February 18 we reproduced a lecture read by Mr. A. J. S. Shewan and Mr. R. Atchison on the subject of "Sandslinging Practice in the Foundry." The discussion was somewhat vitiated by attempts at comparison with other methods under conditions which precluded any valuable conclusions being drawn.

In introducing the authors, Mr. Stubbs (the chairman) said that Mr. A. J. S. Shewan was assistant works manager, and Mr. Atchison the foundry manager, to Messrs. Worthington-Simpson, Limited, of Newark-on-Trent.

A vote of thanks to the authors was proposed by Mr. Marsden, seconded by Mr. J. Hogg, and passed with acclamation. The discussion was opened by Mr. E. Flower, who asked what time was allotted for preparing the mould for the sandslinger, as he had heard that in one foundry the impeller had to be changed several times a day; he asked what was the cost of its upkeep and also that of the general upkeep of the machine. What was the procedure in regard to ramming a large top part, say 10 ft. by 6 ft. by 2 ft. deep, which had permanent bars attached to the top box part? How much time was allotted to the hand-ramming of such a top part prior to it being ready for the sandslinging operation? Was it possible for a sandslinger to ram underneath box bars without leaving any soft spot, providing the pattern came to within, say, 2 in. under the bars?

Mr. Atchison said the facing sand was placed on the pattern; the moulder patted it round and the box was placed in position. Then, if the sandslinger was not available, he went to another job. When that was finished he returned to the other job, and, having notified the sandslinger operator that it was ready, the apparatus man would come along and ram up the job. He knew the vital points. The sandslinger would not ram underneath the stay bars of boxes, but when he got to that point he would call the moulder to do that particular bit by hard ramming.

Impeller Life.

They could ram for two days with one impeller. They made the impellers themselves in a little iron mould which was always standing ready. One poured it in, another knocked it out. They could get 30 or 40 in one afternoon, and practically no time went down to it. They poured these from spare metal in shanks. They might use one per day, but never two, unless something unforeseen happened and the impeller was broken. They were very hard, due to being chill cast. It did not take the man more than three minutes to replace one.

The sandslinger did away with the "donkey" work of moulding, fewer moulders were required and a man could have 30 to 40 yds. of floor space to himself. One moulder could prepare six moulds, and as they were rammed up they were sent to him to finish. Like all other machines, the sandslinger must be kept in good condition and in proper repair. It should be borne in mind also that the foundry must be a suitable one for the sandslinger to work in, and there must be other equipment. Although he had three large stoves, he had insufficient plant when busy. For the direct ramming of anything of a simple character, there was nothing superior to the sandslinger.

He had been many years in foundry and had never told a man not to vent his mould, as more venting the better the casting. It was, in his opinion, wrong to say a mould did not require venting because it was rammed by sandslinger or jolt-rammed.

Mr. Flower: What advantage has the sandslinger over a large jolt machine?

Mr. Atchison replied that with a jolting machine most things had to be made for it, and only one box part could be used. The sandslinger had the advantage that any box would do. Any type of box could be put on the top and turned over.

Jolting Machine Advocated.

Mr. A. L. Key said sometimes the best results were got from a discussion by making it a little contentious. He was known to be a strong advocate of the jolting machine, and he spoke with experience when he claimed that some jobs could be done quicker with the jolting machine than with the sandslinger. Possibly that might not apply to the particular shop they were now considering. The whole question turned on the type of shop. One job had been shown that was made with the sandslinger, but with a jolting machine it would not take more than one minute to ram, whether there was 10 or 200 cub. ft. of sand in the box.

The point was raised that with the jolting machine they must have special boxes. With the sandslinger a special machine was required, costing perhaps £3,000. Interest and depreciation had to be paid. The jolting machine need not cost as much in a month as the sandslinger would in a day. Once the boxes were got the operation could be repeated. The sequence was: Put the pattern on the board, ram up the bottom, turn it over, rub it off, and proceed with a fresh pattern. A suitable type of machine for fitting in the boxes is essential; one that aerated the sand so that it could be thrown direct into the box. He had in mind a machine which would utilise two men throwing sand into it as fast as they could. The sand could be worked with about half the moisture which was required with ordinary black sand. The procedure was simple, and consisted of filling the box, putting on the jolter, and ramming it up. The actual ramming was done in one minute.

He would not entertain the idea of a jolting machine unless it was for a continuous repetition job for one size of box. The machine he had in mind was a shockless plain jolt. On that machine he had rammed boxes 16 ft. long, 7 ft. wide, 2 ft. deep. So it was a versatile machine, not quite as large as the sandslinger, but quite equal to it when the cost of the plant was taken into comparison.

On two occasions he had visited the foundry which the authors represented. He worked there himself for four and a-half years, and they did jobs then similar to what were being done now. Perhaps they were made quicker then than now. In other shops he had seen sandslingers, sometimes working, sometimes not, and on the basis of what he had seen he personally would not entertain the idea of a sandslinger on those lines. Much money was locked up in one machine which could be more profitably spread over a few machines.

Air Consumption and Upkeep.

Mr. Atchison: What about the air consumption?

Mr. Key: You are carrying 42 h.p. on your machine, whilst 35 h.p. would develop enough air for an adequate jolter, allowing for as much sand-blasting plant as is necessary. One could have all the compressed-air service necessary to run a foundry of that size with 35 h.p.

Mr. Atchison: How long will the jolting machine keep up to standard?

Mr. Key replied that in five years he spent £5 in repairs on a jolting machine.

Mr. Atchison: How long do pin-holes in the boxes maintain a proper fit without being bushed?

Mr. Key said the pin-holes would last as long as they would when using a sandslinger.

Mr. Atchison said there were no pins in the boxes to be used on the sandslinger. With the sandslinger any pattern that came into the shop could be put into any box, but if one was going to use a jolting machine there must be much preparation.

Mr. Key said brass bushes were used. If they wanted to renew a bush, a man brought a ladle of metal, poured the contents on to the pin, and in ten minutes there was a new brass bush. It did not take longer to cast a pin-bush than to change a pattern when using the sandslinger.

Mr. Atchison remarked that his firm had four or five mould machines, but they could not do without a sandslinger, because there would be many long delays. He must have both moulding machines and sandslinger. But he had never operated a jolt rammer which stood up to continuous use long enough to pay for itself on general work. He and his colleague had not commercial interest in the sandslinger, but were endeavouring to give their experience, and they were prepared to demonstrate it at any time. The question must be studied afresh in every foundry. Not every foundry had sufficient work of a general range to justify the installation of a sandslinger. But in their own case, from their point of view, the sandslinger was a better proposition than a jolting machine for general work.

Mr. Key: You undoubtedly do more with it.

Mr. Shewan said that from the mechanical point of view the sandslinger was a much better proposition than any jolting machine he had encountered. The sooner the foundryman's tools are designed by a high-class skilled engineer the better. Moulding processes in general were mechanical and demanded mechanical equipment.

Mr. A. Jackson said in his district (N.E. Lancashire) they discussed the sandslingers, but did not use them. The important question was whether they could be used in their class of work and discussed less. There were four or five operations, which were moulding, mixing and conveying the sand, preparation, filling and ramming the boxes. No doubt in heavy classes of work the sandslinger would eliminate a maximum amount of hard labour, but what about the preparation? There was the question of loose pockets and recesses. No better way of filling those had been devised than to sling the sand by hand, and there was no better test than by the fingers to ascertain whether the material was rammed hard enough. Could the sandslinger perform these operations?

Would the sandslinger be of any real service in a small workshop where the boxes were 4 ft. to 1 ft. deep, where there were numerous bars and the weight of the average casting was very small, up to 4 cwts.? Would the sandslinger be of any use in a works of that description?

Mr. Atchison replied that he would not recommend the sandslinger for use with small boxes for jobbing work. One would never recover the cost. As regards the preparation, by having a sand-mixing plant and the boxes knocked out in front of it, only two men were needed, just forcing the sand through the grid. The grid was then stopped, and the boxes were all knocked out. As the sand got farther away, they shovelled it in. With one man at the head of the sandslinger, that was all the labour on it, so much non-productive labour was eliminated. There, again, the question arose that there must be other plant as well as the sandslinger. He would not recommend the sandslinger for small boxes with small quantities.

Small Castings Made by Sandslinger.

Mr. E. Longden said he thought the opinions of foundrymen about moulding machines, including the sandslinger, were formed more or less by their experience. He had used the sandslinger; he had also used moulding machines. It had been suggested the sandslinger was not suitable for small boxes. In America, at the Ford Detroit works and elsewhere, what he might describe as cut-down types of sandslingers were installed—a simple slinger, head and arm operating daily, fed by sand from a continuous overhead conveyor belt. Cores and moulds were made by such a machine for a variety of small castings as used in automobiles. Of the many sandslingers he had seen, nine out of ten were

white elephants, because of the lack of accompanying and complementary equipment. He must add, however, that better use was now being made of the locomotive or traction type of sandslinger in jobbing foundries. They had got to remember that any tool introduced into the foundry was dependent upon the type of man who used it. There was apparent and real success. Very often a machine was made to appear successful at the expense of other sections of the foundry.

Were the authors quite sure what the total costs were? The figures showed a reduction of 25 per cent. Did they include the labour in mixing the sand, conveying the sand to one point, and so on? Was all that taken account of? Could the authors give figures showing that the total costs of the foundry had gone down in the period of four years in which they had operated the machine? He had seen the machine mentioned by the authors, and would say that they were operating it more efficiently than any he had seen elsewhere. The portable sandslinger could be most satisfactorily employed in ramming up large top-part moulding boxes. In that case one could cut down such labour by 90 per cent., which was a very appreciable saving on the whole of the mould.

It was certainly necessary that the sandslinger should have accompanying equipment in order to succeed. That brought to mind the enormous working area occupied by the locomotive slinger about the shop, and the consequent reduction of output through depriving oneself of effective moulding area. He estimated it at 25 per cent. The equipment was very elaborate, and would cost something like £4,000. It would be a long time before one could recover the expenditure of £4,000; the money might be better used in securing a combination of a simple portable sandslinger and moulding machines. The modern plain jolt-ramming machine did not need as much equipment or preparation as suggested. With a large jolting machine, half-a-dozen boxes could be placed on the machine and jolted together without even fastening the moulding boxes to the table, such operations being accomplished in a minute or so.

Floor Space.

The Chairman said in an Italian foundry he saw a sandslinger ramming boxes from about 18 in. square. The machine was automatically fed from overhead, and there was no doubt about the efficiency of it. Mr. Atchison and Mr. Shewan had dwelt very largely upon the traction type of machine, and probably for the average foundry that was far too costly and much too cumbersome. If installed in the foundry he was connected with, 30 per cent. of the floor space would be used up in accommodating the track. Instead of that they used a portable type of machine, and their experience of it was that it gave 100 per cent. efficiency. The basis of its success was the organisation behind it. It was useless having a skilled man leaning on his spade while the labourer was ramming with the machine. The moulder ought to be on another job, actually moulding, whilst the labourer was ramming with the machine. After all, the sandslinger was purely a ramming machine. They had seen a machine ram a top part 10 ft. square, 12 in. deep, in 17 minutes. That was a vast improvement on hand-rammed or jolted work. This was, of course, done with a traction-type machine having its own hopper full of sand from an automatic overhead feed.

On the machine there was a riddling apparatus which threw out gaggers, sprigs, stones or other foreign matter from the sand before it went on to the conveyor belt. From their machine the average saving in time was at least 20 per cent., in some cases as high as 60 per cent. They found difficulty in getting the man working the machine to wear goggles. Did Mr. Shewan's men wear them, and if so what type? Perhaps Mr. Shewan could say what the cost of electricity per hour was on their type of machine.

Mr. Shewan said he preferred not to give any figures as to the cost of electricity, as this introduced too many complications. The men preferred to use the ordinary motor goggles that fitted too closely around the eyes.

Publications Received.

British Chemical Standards. — The Report on the fifth three years' working of this movement, mention of the General Meeting of which appeared in our issue of January 28, is now issued. The subject-matter of the different sections is clearly set out on the contents page for ready reference. Then follow brief explanatory remarks in six European languages, which show what the movement is, and its objects; next, what the standards are, how they are jointly standardised by co-operators representing different countries, interests and sections of industry; what their function is—how figures in chemical specification have no fixed value unless gauged by a definite standard sample, recognised by chemists all over the world, which enables errors in analysis to be detected just as a template reveals error in a section; and lastly, a section showing that ultimately the whole community benefits.

At the end of the last period of the five periods reviewed (September, 1931), there were 104 co-operators, of which 79 are in Great Britain and 25 in other countries; with 1,121 laboratories using the standards, 853 in Great Britain and 268 in 14 European countries, and 20 in Asia, America, Australia, Africa and Oceania.

A list of the industries using them, besides including those one would expect—relating to iron and steel, non-ferrous metals, ores, slags, agriculture, railways, motors and aircraft—is followed by another which is very striking, because of the widely-differing types of business in which one might not expect the standards to be required.

As regards tonnage controlled by these standards, it is shown that a co-ordinating effect is exercised over many millions of tons of material representing very large value, whilst disputes and delays are saved and benefits gained in many ways at an infinitesimal cost per ton. It is interesting that amid the users there are known to be at least forty-seven universities, colleges and technical schools, both here and abroad. A subsidiary educational advantage is the supply of a special series of analysed samples which professors, etc., can give out to students on which the latter can practise analysis. These, too, already over 45 colleges, etc., are using.

A new development—the supply of pure standardised reagents and metals for volumetric analysis, calorimetry and pyrometry, of definitely determined exact composition—is described. Full lists, both of the co-operators and of the standards now available, are given.

In some extracts from a talk at Johannesburg before the South African chemists by the Senior Organiser, he traces the growth of the analytical standardisation work from 1876 onward, including the use of standardised methods under the "Analoid" system by which already fifteen million tests have been made—and which is described in a leaflet inserted in the report—till it culminated in 1916 in the commencement of the present movement described thenceforward in the successive reports.

Reference is then made to the endeavour by the Association of British Chemical Manufacturers to get one central standardising body, which has resulted in the change of title of the B.E.S.A., with an extended charter to include chemical standardisation, to that of the "British Standards Institution"; and to the prospect of this proving no hindrance but rather a help to the British Chemical Standards Movement; to clearing house work, by which the methods and working of the chemists engaged in the preparation of British Chemical Standards tend to be clarified and to yield consistent results as between different chemists with less difficulty, and to many other matters.

The whole will be found very interesting and informative to all who are concerned with analytical agreement between chemists and who feel very properly that figures for composition, whether specified or not, should have the same value all over the world. Without standards there is no practicable means of assuring this, or of verifying whether or not the figures are right; with standards there is.

The rapid and ever widening growth of the movement, in spite of the many difficulties in these disturbed times, and with no external financial support, demonstrates indisputably the need that is felt for the work, and what can be achieved by voluntary co-operation where the dominating purpose is to get on with the work, and conventional formalities are subordinated and kept to a minimum. We understand that a copy of the report will be sent to our readers on application to Messrs. Ridsdale & Company, Organising Headquarters, 3, Wilson Street, Middlesbrough, England.

City of Birmingham Handbook, 1932.—This has now become an annual publication, as, obviously, unless right up to date, half its interest is lost. As previous, it is divided into about twenty sections, covering close on 300 pages. It should not be thought that this work is designed to induce people to establish works in the vicinity, as for this purpose another publication is available. In plain English, it is the story of what Birmingham is, what it does and how it does it, and, moreover, it is a very well-written and interesting story.

A Novel Core-Shop Tool.

(*Concluded from page* 141.)

range of about 6 in., giving a maximum of 10 in. The table on which the corebox is placed is circular and easily rotatable, as it is mounted on ball bearings and provided with three handles. At the centre of the table is the end of a vibrator hammer, which contacts with the core-box. The machine being mounted near the edge of a bench, the designers have thoughtfully placed a knee-operated valve for the operation of the vibrator, which leaves both the operator's hands free. A blow-gun valve, for ridding the boxes of any odd grains of sand between operations, is included with each machine. The machine is operated with compressed air at 80 lbs. per sq. in. pressure, but the actual consumption is almost negligible.

Operation Details.

The operator having filled both halves of a core-box, the two parts are lightly put together and placed on the machine; the operating valve is opened, which causes the presser head to close the halves tightly together. The ends of the cores are packed, any reinforcing wires that may be necessary are inserted, and venting is carried out in the usual way. These actions are simplified as the core-box is rotated to a suitable position whilst still under pressure. All that remains to be done now is to press in knee-operated valve, allow the vibrator to work for a few seconds, release the presser head, and remove the finished core. The object of making the presser head removable is to enable its replacement by an irregularly-shaped component to take care of core-boxes of similarly irregular contour, whilst the piston-speed control valve is to allow of differentiation being made when using wooden and metal core-boxes.

At a meeting, at York, of the Engineering and Shipbuilding Trades Federation, it was stated that, directly and indirectly, the cessation of work on the Cunard liner at Clydebank had affected 10,500 members.

The Modern Blast Furnace.*

By Geo. E. Butler, F.C.S., A.M.I.Chem.E.

In these days of intense international competition it is well that we should be conversant with what is being done by our competitors, and that we should study the main economic features which have become practically standard amongst them. Great strides have been made, particularly during the last five years, in the United States and on the Continent, in blast-furnace practice, with the result that the modern intensively-worked furnace in these countries is producing from 700 to 1,100 tons per day. The tendency in the United States is towards exceptionally large hearth furnaces, with consequent increased output capacities, from which, along with improvements in equipment and methods, much progress in production economy has resulted.

Similar economies have been achieved in Germany by careful attention to the selection and preparation of materials. Screening and sizing of coke, ores and limestone, together with sintering of fine ores, have brought about greater permeability of the charge, with a resultant economical increase in the efficiency and speed of operation and increased output per sq. ft. of hearth area.

Development of Blast-Furnace Lines in America.

It is interesting to note how the modern large-output furnace has been arrived at by studying the development of American blast furnaces as shown by the various changes in furnace lines made during the last fifty years. The pioneers in this modern advancement were the Edgar Thomson furnaces of the Carnegie Steel Company; at this plant, between the years 1880 and 1901, an intense study was made of all details of operation and their effect on furnace lines.

First Period.—The principal features of the 1880 Edgar Thomson "B" furnace were: High bosh, 27 ft. high; steep bosh angle, 80 deg. 34 min.; small hearth, 11 ft. dia.; bosh dia., 20 ft. This furnace had a low make of 840 tons per week, with a high coke consumption of 28.12 cwts. In 1890 the "H" furnace was built, and in this the bosh height was reduced from 27 ft. to 20 ft., the bosh angle being flattened from 80 deg. 34 min. to 74½ deg.; this furnace averaged 2,275 tons a week. In 1901, on relining the "D" furnace, the bosh height was again radically reduced, being cut down to 12 ft. by increasing the hearth diameter to 14½ ft. and by further flattening the bosh angle to 73½ deg. This furnace averaged 3,243 tons per week on a coke consumption of 19.88 cwts. From this time the height of the bosh has never been increased. This radical reduction of the bosh height by flattening the bosh angles is the chief feature of this period, and was a definite improvement in blast-furnace design.

Second Period.—The second period of development began in 1905 at the Illinois Steel Company's South Works, and the improvement was effected by increasing the hearth diameter, with the object of steepening the bosh angle and not of reducing the bosh height, which remained stationary at about 12 ft. The 1905 South Works "E" furnace had a 16-ft. hearth, 76 deg. bosh angle, bosh 12 ft. high by 22 ft. dia., and averaged 3,267 tons per week on 19.79 cwts. of coke. The bosh angle was gradually steepened in other furnaces at these works, as they were relined, until it reached 80 deg. 33 min. on a furnace with 22-ft. dia. bosh and 18-ft. 9-in. hearth; these changes were marked by steady improvement in furnace operation and results. The average make of their No. 7 furnace, built in 1927, for the whole of 1929, was 4,757 tons per week on 17.28 cwts. of coke.

It will be noticed that the 1927 South Wales furnace has gone back to exactly the same steep bosh as that of the 1880 Edgar Thomson furnace, but with vastly different lines, owing to the reduction of the bosh height, which is the same as that of the 1901 Edgar Thomson furnace. The chief feature of this period is the steady increase in hearth diameter by steepening the bosh angle. It is also to be noted that, for the first time, furnaces were built in which the hearth diameter was greater than that of the stock-line diameter, such as the 1927 South Works furnace with 18-ft. 9-in. hearth diameter and 17-ft. stock-line diameter.

The fear of insufficient penetration at the tuyeres, should the hearth diameter become too great, appears to have kept back progress in blast-furnace design for about 50 years.

Third Period.—In the next period, commencing about 1925, instead of keeping the bosh diameter at 22 ft., the hearth diameter is increased to 22 ft., and the bosh made correspondingly larger, 25 to 26 ft. The 1927 Gary furnace, with 22-ft. 3-in. hearth, 26-ft. bosh, 17½-ft. stockline and 94½-ft. total height, has an average make of 6,160 tons per week with a coke consumption of 16.47 cwts., and has produced 939,000 tons in three years.

Hearth diameters are still increasing, since the fear of non-penetration at the tuyeres has been overcome, with the result that hearths of 25 to 26 ft. dia., with outputs of 1,000 tons per day, are now becoming quite common in the States. Hearths of 28½ ft. dia. are now being installed. The chief feature of the current period is the scrapping of the 22-ft. dia. bosh, hitherto the basis of American furnace lines, and its replacement by the large bosh of 28 or 29 ft.

The tendency of to-day is well exemplified by pointing out that the superintendent of the Duquesne furnaces states that, if he had the opportunity, he would build a furnace with 28-ft. hearth, 87 deg. bosh angle, 20-ft. stockline and 105 ft. total height. The lines of the present exceptionally large American furnaces have certainly not yet reached finality. Although they produce the desired 1,000 tons per day, this is accompanied by relatively high coke consumption and high flue-dust losses. Further, they produce less iron per sq. ft. of hearth area as compared with smaller furnaces.

CONTINENTAL LARGE OUTPUT FURNACE.

In most European countries, for many years prior to the war, very little progress was made in blast-furnace construction. The hearth diameter was generally under 14 ft. Since the war, however, many Continental plants have had to be rebuilt owing to devastation and need for low labour costs. As a result, designers have had no hesitation in re-erecting their plants on new sites, completely scrapping the old plants when these have not suited modern ideas of organisation.

The development of the 1,000-ton furnace in Germany has been attained through improvement of furnace lines, accompanied by careful preparation of raw materials, allowing large volumes of blast to be blown at comparatively low pressures. With this practice extremely large hearths are not considered necessary, and outputs of 1,000 tons per day are being produced on hearths of 17 and 18 ft., although with increased dust losses.

It has been necessary, in order to attain such large outputs, to increase the rate of combustion of the coke; this has meant increasing the surface of combustion in the tuyere zone, and this has been obtained by putting in larger hearths and more tuyeres. To give the burden reasonable time for its adequate reduction, the height of the furnace has had to be increased to 90 to 95 ft., as against the 65- to 75-ft. furnaces so often to be seen in many districts. The bosh height has been reduced to the extreme limit of 10 ft., so as to concentrate the heat in the lower part of the furnace; at the same time the bosh angle has been steepened to 80 deg., and as far as 84 deg., so as to do away with the dead zone at the junction of the bosh and shaft and to give a better distribution to the ascending gas current over the whole section of the furnace. This also makes the descent of the charge easier. To lessen the quantity of dust carried over into the dust-catchers, large throats have been put in and special dust-reducing devices have been fitted to the furnace tops in order to lower the velocity of the gas stream at the top of the furnace. The larger hearth has definitely resulted in a much better descent of the charge, and large outputs are obtained with these furnaces under more economical conditions than is the case with the older type of furnace and with considerably less trouble than formerly.

Since the modern furnace has to burn a large quantity of coke, blast-furnace operation has had to undergo great changes in order to solve the problem of large outputs and a large constant and continuous volume of blast becomes necessary. Any change in the volume of blast, influences the intensity and extent of the combustion zone and upsets the descent of the charge and so tends to cause irregularity of working. Such modifications in the operation of the furnace have necessarily resulted in alterations in its design and construction. In order to achieve the desired results and obtain the fullest economy, every constructional detail must be carefully and thoroughly studied and methods found of avoiding stoppages, such as changing the tuyeres, stopping taphole, and preventing scaffolds and break-outs. It has also meant the scrapping of many old-fashioned ideas and the systematic replacement by machinery of all manual labour.

Hearth Jackets.

The consequences of break-outs, owing to the larger tonnages of iron and slag carried in the hearth, are much more serious in the modern large furnace than in the older-type furnace. Hearth jackets have, therefore, had to be provided of such a design as will reduce the possibility of break-outs, to an absolute minimum, even if not guaranteeing complete prevention. In the old types of hearth construction, the hearth walls were, in some cases, held together by steel bands, the surface of the bands and bricks being sprayed with water. In others, the hearths were surrounded by rows of steel ribs, strongly held together by straps and cooled with water sprays, or sometimes a jacket of thick cast-iron segments, rigidly bolted and strapped together, was used. All these types have been given up owing to their inability to stand up to the new conditions.

These have been replaced by a massive jacket, such as is in universal use in the States and to be found on many Continental plants, made up of a series of cast-steel segments, 3½ to 4½ in. thick, with perfectly-machined joints, rigidly bolted together and securely strapped by means of three to five flats at least 1 in. thick and 14 to 16 in. wide. Each segment has cast inside it two U-pipes of 1½-in. bore which are fed with water under pressure, and the feed and discharge water pipes are so coupled that each segment has only one feed and one discharge, thus making each segment independent for its water supply; these pipes are so arranged that they are not an encumbrance round the hearth.

The jackets are truncated or conical in shape, with the wide diameter at the bottom, and go down to a depth of 8 ft. below the taphole, the top being level with the slag notch. In practice, the hearth brickwork tends to be worn away in the shape of a pear owing to the downward action of the blast, and the shape of the jacket follows this line of wear. Although this shape of jacket has been criticised owing to its possible tendency to lift up, due to expansion of the brickwork of the hearth bottom, competent observers have failed to notice anything of this kind, providing certain elementary precautions are taken.

(To be continued.)

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* Paper read on February 1 before the Cleveland Institution of Engineers at Middlesbrough.

Foundry Selling Practice.

By Eric N. Simons.

(*Continued from page* 374, *Vol.* 45.)

No. 13. SALES RECORDS.

Many foundries that have excellent organisation in their production departments are notably deficient in the managing of certain sections of their sales work. A feature of any well-managed sales department is the existence of a set of sales records, clear, comprehensive and efficient. Only actual experience of the time such a set of records can save will indicate their exact value; but in the space at his disposal the writer will endeavour to indicate the scope and systematisation of a sales records department.

A Sales Record Scheme.

The essence of the scheme, as practised in one of the largest steel foundries in the country, is to have a précis-sheet or series of sheets (according to the frequency of transactions) for each individual customer. Such a sheet is illustrated in Fig. 1. Now the principle of sales records is not to set down an abstract of every communication between the foundry and its customers, but to have a handy and complete record of everything affecting sales that has occurred. The essentials are, as will be seen from an examination of Fig. 1, the full name and address of the customer, his financial standing, the character of his business, and, if known, the name or names of the people or persons whom the representative should see or is in the habit of seeing.

Next comes what may be termed the fluctuating information. In the first column is set down the name of the particular type of casting for which orders have been received, or inquiries dealt with. In the next column appears the date of orders received. There follows a brief indication of the prices at which the order was taken. Then comes the date of the inquiry and the date on which the quotation was sent out, followed by the quoted price. There is a column for the date of the last call made by a representative, and to finish off the sheet a column for remarks appears at the extreme right. In this last and most important column is inserted a précis of the representative's report on his call.

It will thus be seen that the sales manager has, once a system of this sort has been established, a compendious record of the status of every individual customer or potential customer, a record that saves endless searching of files for missing or mislaid correspondence, that enables him to see at a glance over a period of years (for, if the sheets are printed back and front, a capable clerk can enter enough records on a couple of sheets to cover two or three years) everything of importance that has occurred in connection with a particular firm, and that will prove of value to him in innumerable ways.

Now a system of this sort may very easily be decided upon in theory, but there are many snags in practice, and it is useless to adopt a sales-records system and expect it to work itself. Careful planning and organisation are essential. Some notes on procedure will, therefore, not be out of place at this juncture.

Having agreed upon sales records, the first requirement is the sheets. These should be of stout good quality paper, stiff enough to stand a good deal of handling, capable of being written on in ink on both sides, and of quarto size. Paper of the sort that is used for ledgers or order books, but a trifle thinner, is excellent for the purpose. The records themselves should be made by hand, in ink, because in the long run this is quicker and more flexible, if not quite so neat, as typewritten records. The time spent in inserting sheets in a typewriter, in arranging the spacing, in running over on to fresh lines because of the inflexibility of the machine, together with the waste of paper (for typewritten records take up more space than hand-written), make this practice definitely inferior to hand-written records.

Filing Arrangements.

Having the sheets, the next requirement is a cabinet or cabinets in which to file them. For this work, nothing is better than strong steel filing cabinets, the drawers of which run on roller bearings. These are largely fireproof and easy to handle. They have the additional advantage that they do not shrink or warp with differences in temperature, as wooden cabinets are apt to do, and they are fairly cheap. Cabinets of this type can be furnished with locks if desired.

Then comes the system of filing, which is important. At first sight, it is simplest to file all the firms in alphabetical order, according to their names, but on closer examination it will be found that, for sales purposes, to file them under towns is the better plan. A few reasons will explain this. One great value such a set of records has, is that it is, in actual fact, a complete list of the firm's customers, actual or possible. If a new salesman is engaged, it is always good practice to give him a complete list of existing or prospective customers in the territory he is going to work. To obtain such a list in the ordinary way means going through order books, cash ledgers, directories, and so forth, a task taking up much time, with results not entirely satisfactory. By using the sales sheets, such a list can be typed out in a quarter of the time, and much information (such as what the firms are interested in, the right men to see, etc.), can be added without much additional trouble. But if the sheets were all filed alphabetically it would mean that someone would have to be set on to go through them and sort out all the names belonging to a particular district. If, however, the sheets are filed geographically, there is no sorting to do, and what is more, the sheets can be kept permanently in representatives' districts, which has many advantages. Furthermore, if a representative intends, at any time, to visit a town (say Coventry) which he has not worked before, the sales department can send him in short time a complete list of all the possible customers in Coventry by simply taking the Coventry sheets and compiling a list from them. Other advantages of this method (*e.g.*, in compiling mailing lists) will be obvious.

The sheets should be filed alphabetically according to towns or districts, and if the paper used is stiff enough, no folders will be needed to retain them. They will stand unsupported by anything other than the stout manila boards used for the alphabetical divisions.

Collecting the Information.

The next point is the provision of the staff, and the arrangements for collecting the information. A capable girl clerk with a good clear hand is necessary. She must be able to make brief and competent précis of letters, and to know what information is useful and what is not. The first need, then, is to see that she gets her material promptly and regularly. This is where snags occur, and if allowed to linger will wreck the system. One of these snags is the tendency for people about the works or offices to "sit on" batches of letters. It must be made perfectly clear that whatever may be done with letters afterwards, they (or those that are for record) must first go to the records clerk. If they are needed by anyone, a slip for return after recording must be attached. In practice, it is found that the establishment of a records system does away with a great deal of this hoarding of reports and letters, for the reason that often correspondence is retained to save the trouble of having to go to the files to refer to what has happened. When everything is briefly and efficiently recorded on a simple sheet there is no need to go to the files. A glance at the sheet is quicker and easier.

In the works where this system is adopted, lists of orders received are made out, daily in some departments, weekly in others, and sent in regularly to the recording clerk, who records the receipt of orders on her sheets, and so effectually stops the sales promotion department from writing reminder letters to customers who have not ordered for some time. Later, when entered and dealt with, the orders themselves go to her before being filed, so that she may enter up prices and other information. Similarly, lists of inquiries received are made out, and later the inquiries themselves, with the quotations attached, go to her for recording.

Representatives' reports and the answers to them are sent to her after being dealt with, if dealt with promptly, but before filing. She has a rubber stamp bearing the word "Noted" and her initials, and filing clerks are given strict instructions that no orders, inquiries, salesmen's reports, or letters to salesmen, are to be filed unless they bear this stamp in the top right-hand corner. Any sales promotion letters to representatives are treated in the same way. As above stated, any material that cannot be

Name of Firm.		Makers of		Financial Standing.			Man to See.
Materials ordered or quoted.	Last order. Date.	Order price.	Inquiry. Date.	Quoted. Date.	Quoted price.	Representative called. Date.	Remarks.

Fig. 1.

(*Continued on page* 152.)

The Effect of Various Elements on the Quasi-isotropic State and the Sensitiveness to Section Thickness of Cast Iron.

The crystalline state is distinguished by its anisotropic character; that is, the properties of the crystals differ in different directions. The materials used in practical service consist of aggregations of crystals. In the case that, with respect to the wall-thickness, the size of the individual crystal is extremely small, the material will show the same properties in any direction. Such a material is called quasi-isotropic. To

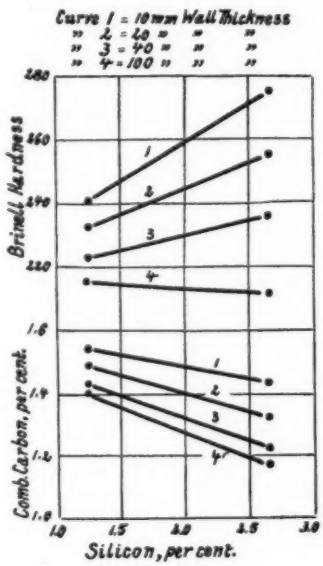


Fig. 1.

reach this state, according to Chochralski, at least ten crystal grains must be present right across the section.

The quasi-isotropic state of cast iron was first examined by P. Oberhoffer and W. Poensgen, who thought the size of the graphite flakes to be predominant.* They determined the strength

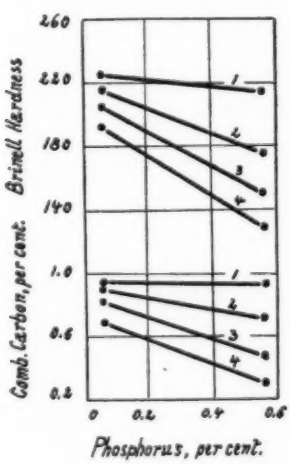


Fig. 2.

of cast-iron bars of various diameters, the bars being cut from an ingot uniformly solidified. The strength increased with increasing diameter, and the quasi-isotropic state was reached at a thickness of 20 to 25 mm., the ratio of the length of the graphite flakes to the diameter of the bar being about 1:100.

* "Stahl und Eisen," 1922, vol. 42, pages 1, 189.

In a recent investigation, E. Piwowarsky and E. Söhnchen† examined the effect of several alloying elements upon the sensitiveness to thickness of cast iron by determining the combined carbon content and the hardness. The tests were made on bars of various diameters and cubes of various edge lengths. The combined carbon was determined as difference of the total carbon and graphite contents. The Brinell test was made with a 10-mm. ball and a load of 1,000 kg. (1 ton) applied for 30 secs. With the test samples of cubical shape, the determinations were made in the intersection point of the space diagonals. The effect of the following elements were examined: silicon, phosphorus, aluminium, nickel and chromium.

Effect of Silicon.

The following two melts were prepared:—(1) T.C., 2.67; Si, 1.25; Mn, 0.06; P, 0.04; and S, 0.02 per cent.; and (2) T.C., 2.71; Si, 2.66; Mn, 0.07; P, 0.065; and S, 0.026 per cent. With the low-silicon iron the combined carbon decreased with increasing wall thickness, and remained constant at thicknesses over 50 mm. (1.97 in.); with the high-silicon iron, the decrease continued. The same was the case with the Brinell hardness. This can be explained by the fact that in light sections hard silico-carbides form, whereas in large sections the softer silico-ferrite is present. The different effect of these two constituents upon the combined carbon content and the hardness is accentuated with increasing silicon con-

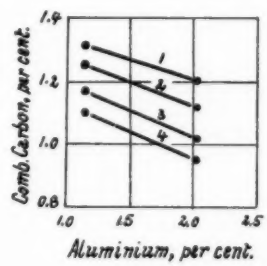


Fig. 3.

tent, as can be seen in Fig. 1. (Note.—In this figure and the following ones the connecting line between the two experimental values in question ought not to be a straight line. However, the differences in the effect of the elements investigated at various wall-thicknesses are most clearly seen with this form of illustration.) The results stated above are in accordance with those of Keep, who found that the transverse strengths of light and thick sections of cast iron differ the more the higher the silicon content is. Thus, silicon impairs the quasi-isotropic state of cast iron and increases its sensitiveness to thickness. Therefore, in order to obtain a high uniformity of the structure and mechanical properties, the silicon must be kept as low as is compatible with the other constituents present.

Effect of Phosphorus.

The following two irons were tested:—(1) T.C., 2.53; Si, 2.15; Mn, 0.27; P, 0.063; and S, 0.02 per cent.; and (2) T.C., 2.64; Si, 2.23; Mn, 0.11; P, 0.565; and S, 0.014 per cent. As can be seen from Fig. 2, the sensitiveness to thickness markedly increases with increasing phosphorus content. Further, phosphorus makes the iron more liable to graphitise. The deterioration of the quasi-isotropic state is caused by the fact that phosphorus, like silicon, has the tendency to change the structure by the formation of steadite. With light sections, because of the high cooling rate, the quantity of steadite increases by segregation; in heavy sections it decreases somewhat until the state of equilibrium is reached. At the same time, with increasing wall thickness, the ternary eutectic changes into the pseudo-binary eutectic, whereby ferrite and graphite are formed.

† "Die Giesserei," 1931, vol. 18, pages 533-537.

Effect of Aluminium.

The following two melts were prepared:—(1) T.C., 2.87; Si, 0.96; Mn, 0.06; P, 0.041; S, 0.012; and Al, 1.13 per cent.; and (2) T.C., 2.92; Si, 0.97; Mn, 0.05; P, 0.040; S, 0.011; and Al, 2.03 per cent. Fig. 3 shows that aluminium favours graphitisation. The wall-thickness lines, on the other hand, diverge only to a slight degree, which means that the effect of aluminium upon the quasi-isotropic state is insignificant. As a matter of fact, with the

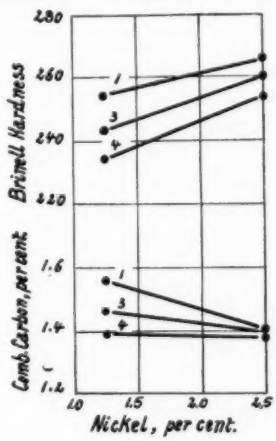


Fig. 4.

small percentages in question, aluminium affects the structure of cast iron only slightly. The results of the Brinell test were not uniform. The authors explain this by the fact that the aluminium added in the form of pure metal was highly oxidised, and the fine films of alumina retained in the iron greatly affected the uniformity of hardness.

Effect of Nickel.

The following two irons were tested:—(1) T.C., 2.71; Si, 1.46; Mn, 0.06; P, 0.065; S, 0.032; and Ni, 1.25 per cent.; and (2) T.C., 2.69; Si, 1.46; Mn, 0.06; P, 0.068; S, 0.032; and Ni, 2.50 per cent. Fig. 4 shows that, with increasing nickel content, the differences in hardness and combined carbon in varying sections greatly diminish. The cause is that nickel graphitises, in the first place, the free hypereutectoid cementite, that is, the hard spots in

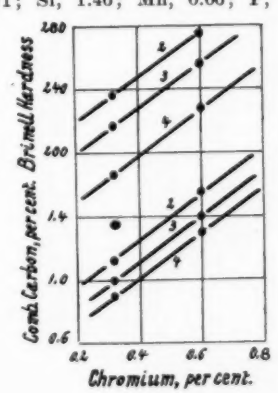


Fig. 5.

(Concluded on page 152.)

London Iron and Steel Exchange.

SIR ROBERT HORNE ON THE OUTLOOK FOR THE STEEL INDUSTRY.

The annual dinner of the London Iron and Steel Exchange was held at the Dorchester Hotel, London, on Wednesday, February 24. Mr. Cyril Watts, Chairman of the Management Committee, presided over a large company, which included the Rt. Hon. Sir Robert Horne, M.P., Mr. Joseph Ward (Master Cutler), Mr. Evan Williams (President of the Mining Association of Great Britain), Mr. A. N. McQuisten (director and general manager of the Furness group of steelworks), Sir William J. Larke (director, National Federation of Iron and Steel Manufacturers), Major L. Beaumont Thomas, M.P. (director, Messrs. Richard Thomas & Company, Limited), Mr. Lewis Jones, M.P. (secretary, South Wales Siemens Steel Association), Mr. Ben Walmsley (Messrs. Dorman, Long & Company, Limited), M. Charles Bastin (Commercial Attaché, Belgian Embassy), M. Armand Donnay (managing director, Banque Belge pour l'Etranger), and M. M. Smits (manager, Banque Belge pour l'Etranger).

Sir Robert Horne, proposing "The Exchange," said that a serious position had developed in the iron and steel industry in recent years. In 1931 we imported 600,000 tons more iron and steel than we did in 1913, and we exported 3,000,000 tons less. For a country that lived upon its exports and for a country that had been a pioneer of the iron and steel industry, for a country whose coal trade depended a great deal upon the iron and steel industry, that was a very ominous fact. Put in another way, whereas in 1913 we exported 2½ million tons more iron and steel than we imported, in 1931 we imported one million tons more than we exported. These figures were very disquieting. It was clear that we had to make up our minds in Great Britain to-day whether we intended to be manufacturers of iron and steel or not. If the drift were allowed to continue there was no doubt at all as to the disastrous result. Did we mean to be manufacturers of iron and steel or did we mean to take our main supplies from other countries? There could only be one answer, for two very sound reasons. In the first place, if we could not manufacture iron and steel profitably, we ought not to be able to manufacture anything at all, because of the advantages with which Nature had provided us. Apart from that, no nation could live to-day, no nation could be powerful in the world, no nation could have any influence whatsoever unless it commanded a sufficient supply of iron and steel to defend itself under all vicissitudes.

Relative Costs.

What were the reasons why we had arrived at the position in which we were? If we considered the conditions of competition between this country and other countries, one reason at least became obvious. If we compared our wages with those of a country which supplied us with the greatest proportion of the 3,000,000 tons that we took from abroad last year, it would be found that their wages were only 40 per cent. of ours. For every shilling they paid in wages we paid 2s. 6d. If we compared the relative income tax, it was seen that for every shilling they paid we paid 3s., and when it was considered what we were bound to spend on social services according to our present rule, it was seen that for every shilling they paid, we paid 15s. This was not a matter of politics. It was a sheer question of arithmetic, and unless all the rules of mathematics were wrong, we could not survive under conditions of that kind.

Therefore, he suggested that if we had made up our minds to have an iron and steel industry in this country we had also to make up our minds how we were going to counteract these conditions. A good deal was said from time to time about the lack of efficiency in the iron and steel trades, and no doubt it was possible to find some works in this country which had not up-to-date plant, but he would make two remarks about that. The first was that the most up-to-date plant that had been constructed in this country since the war had not been able to meet the competition he had described, and in the second place, those who had not been able to keep their plant up to date had been forced into that position by the fact that the tax gatherer had collected from them all the resources which they could put aside for the purpose of re-equipping themselves. Accordingly, we were forced back to a consideration of those devices which were now receiving the attention of Parliament. Should we have a tariff or should we not? Every other nation in the world, except ourselves, had defended itself by means of a tariff. The objection that was taken as a rule to a tariff was that it deprived us of the opportunity, which free trade gave us, of buying in the cheapest market, but were we really buying in the cheapest market when we bought 3,000,000 tons of steel from abroad? Account must be taken of all the items that came into the balance sheet. It could be taken that 100,000 men lost their work through the purchase of 3,000,000 tons of foreign steel. Taking the saving on the current price of that material as compared with British at an average of 30s. per ton, that was £4,500,000, but it cost the country at least £6,500,000 a year to keep the people who had been thrown out of employment by way of unemployment benefit, and it would actually be cheaper for the country to subsidise the purchasers of steel to the extent of the full amount of the difference. That, however, was only one item in the account, because these people, if they were at work in the steel trade, would be drawing wages to the extent of between £12,000,000 and £14,000,000 in the year. There would also be employed some 40,000 colliers in producing an additional 9,000,000 tons of coal for the manufacture of the steel, and that would mean the distribution of £4,500,000 per annum in wages in the coalfields, and these men were at present unemployed and drawing benefit. Then there were the limestone workers and the ironstone workers and the increased transport required. Instead of buying our steel in the cheapest market at the present time we were actually buying it in the dearest market in the world.

A Bargaining Weapon.

We were emerging into a changed world. It was certain that there would be tariffs in this country. There would be a 10 per cent. tariff on all articles which were not in the free list, and those concerned with the steel trade would have to make up their minds on that and to consider the possibility that the Tariff Commission might impose a higher import duty if it could be proved by the trade that a higher duty was required. He did not think it was too optimistic to suggest that the London Iron and Steel Exchange would now have to organise its operations on the basis of marketing British steel, where previously some of its members were marketing foreign steel. He appreciated that that might not be easy, but might he suggest certain lines? At one time he had attempted to help in making arrangements with foreign producers, but the prime difficulty was that the iron and steel industry in this country was not sufficiently organised to speak as a body. In the second place, a very obvious difficulty was that we had nothing to offer. Our market was free to other countries under any conditions that existed then, and it was impossible to make any kind of bargain which would be good for us. With a duty on imported steel, however, it was obvious that we had cards to play which we never had in our hands before. Therefore he ventured to suggest that the proper development of trade in this great industry should be along the line of not attempting to cut each other's throat, Germany against France and France against England. Germany and France had already come to certain agreements which at the moment were somewhat precarious, but in these matters it was always possible to be a combined force, and he believed it would be found much more easy to have a tripartite, or a quadruple arrangement, by taking in Belgium, and to keep it consistent, than was the case when this country was completely outside.

Export Trade Difficulties.

The Chairman (Mr. Cyril Watts), responding to the toast, reviewed the course of events, starting with the financial collapse on the Continent early in 1931, which had led up to the present world position. The chief cause of the present position was the failure in commodity prices, which had carried with a lack of confidence. There were several theories as to the reason for the fall in prices, but the man in the street necessarily asked what was going to be done. Personally, he felt that the first and most important thing to do was to settle once for all the problem of reparations and war debts. Then there must be got out of mind any question of deflation, whilst the next step should be a still further reduction in the bank rate. More credit facilities were required if there were to be any considerable revival of trade in this country. The abolition of exchange restrictions was also necessary. Those engaged in the export trade knew how extremely difficult it was to conduct business at all at the present time. The offices of exporters were fast becoming banks. There must be some co-ordinated international effort, based upon a definite currency standard. It did not matter what that standard was. Finally, there was the question of tariffs, and he was in agreement with those who argued that this country must put itself in a position of being able to negotiate a more sensible commercial policy with other countries.

He had said very little about the steel trade for special reasons. They were all engaged in it and knew all about its difficulties. Then in the National Federation of Iron and Steel Manufacturers, and a trade Press which was second to none in the world, there were means for obtaining all the data required in connection with the trade, and, thirdly, he did not feel competent to address such a gathering on such a subject. At the same time, the steel industry should not rest content with having secured a tariff. That was not the end of their troubles.

Mr. James Whitby proposed "The Visitors," and coupled with the toast the names of Mr. Joseph Ward (Master of the Cutlers' Company of Hallamshire) and Mr. Evan Williams (President of the Mining Association of Great Britain).

Economics of Production.

Mr. Joseph Ward, who made the first response, spoke of the courageous manner in which the iron and steel industries of this country had carried on in the face of unprecedented difficulties. He referred to the cumulative effect upon the trade of the country generally if our iron and steel manufacturers could secure business which would result in their outputs being increased to 80 or 90 per cent. of their works capacity, and contended that the solution of the difficulties under which trade in this country was now suffering was a return to normal international credit and means whereby new capital could be obtained for the extension and modernisation of works. An important step towards bringing about the latter would be the total prohibition of dumped iron and steel, which had been coming into the country in such large quantities for so many years and in abnormal quantities during the past few months. It had been a disappointment that the National Government had only proposed a 10 per cent. duty on imported iron and steel, and he strongly advocated much stronger measures. It had never been sufficiently realised how much unemployment had increased by allowing three million tons of iron and steel to be imported into this country annually. Every effort should be made to get it widely known that for every ton of steel imported our collieries were deprived of producing 3 tons of coal, and our iron-ore mines were deprived of about the same tonnage. Then, again, there should be a strong complaint at the action of the Government under Clause 11 of the Imports Bill in exempting iron and steel required for shipbuilding and repairing. That would open the floodgates and probably let in free everything that ships required, which would be altogether unfair. Finally, Mr. Ward urged propaganda based on the superior quality of British goods.

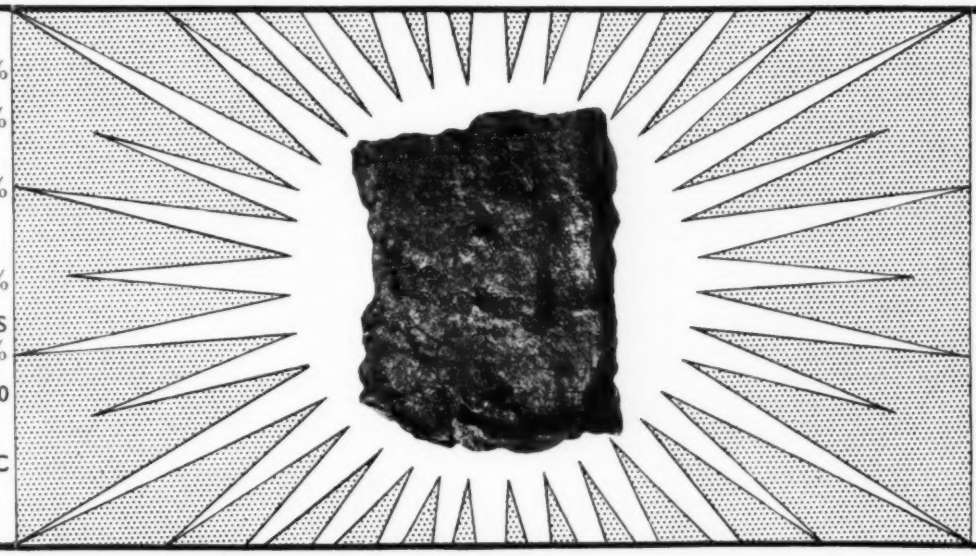
Mr. Evan Williams referred to the important part which would be played in the restoration of the coal industry to some semblance of prosperity if it could obtain orders for the coal that would be necessary to make, in this country, the millions of tons of imported iron and steel. He claimed there was no lack of efficiency in the coal industry; indeed, on the contrary, there had been a greater degree of modernisation in the coal industry than in many others here in recent years. One of the great troubles of the industry had been the interference of the politician. There had been a succession of legislation since 1912. The industry had not been allowed to settle down and conduct its business in its own way, and unless the coal and other industries could feel they were going to have peace from the politicians he saw no prospect of those responsible getting down and tackling the problem of the reduction in costs, which was so absolutely necessary. Although the tariff would be of enormous benefit, it was not the only problem that had to be faced. In every industry the problem was to increase efficiency and reduce costs.

The final toast of "The Chairman" was proposed by Sir William Larke, K.B.E.

PRIESTMAN FOUNDRY COKE

FOR GREAT HEAT

ASH 6·5%
SULPHUR ·7%
VOLATILE MATTER 1·0%
FIXED CARBON 91·8%
PHOSPHORUS ·009%
B.T.U. 13,250
ASH FUSING POINT 1,580° C



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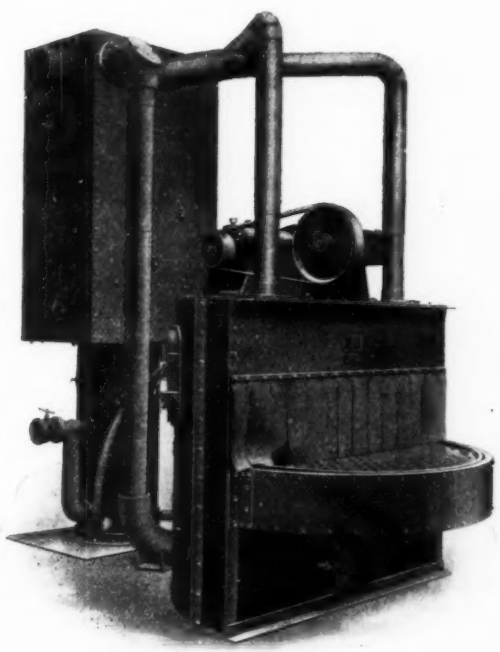

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This Week's News in Brief.

Trade Talk.

The London Midland & Scottish Railway Company has placed orders for 130 new steam locomotives to be built in its workshops at Crewe and Derby during 1932

A message from Berlin states that the Krupp concern has decided to introduce short time for its technical and business employees, this being equivalent to an average reduction of salaries by 15 per cent. It is foreshadowed that 2,000 workers and employees must be dismissed at the beginning of March, unless there is an improvement in the receipt of orders.

The English Steel Corporation, Limited, recently despatched from their Grimesthorpe Foundry to the works of Messrs. Davy Bros., Limited, for machining, a baseplate casting 35 ft. long by 8 ft. by 4 ft., weighing 47½ tons, for a 1,200-ton hydraulic press. The hydraulic press will be used at the Grimesthorpe works of the Corporation for pressing chassis for large motor-lorries and charabancs.

The Stanton Ironworks Company, Limited, near Nottingham, have recently completed a new plant for the manufacture, on mass-production lines, of standard specials of 3-in., 4-in. and 6-in. dia. sizes for use with cast-iron and centrifugally-made pipes. These special castings are being offered at a price substantially below present prevailing prices, and in finish and quality are superior to those produced by older methods of manufacture.

The Siemens steel-making, heavy engineering and armament plants at the famous Armstrong Whitworth Works, Openshaw, Manchester, have ceased to function, as a contract for dismantling, which is probably the largest of its kind, has been fixed with Thos. W. Ward, Limited, the well-known Sheffield firm, who will commence operations at once. It is understood that the crucible-steel and small-tools departments at North Street Works, employing about 600 to 700 men, will still continue to operate.

An appeal to the Minister of Transport to tackle the problem of the relation between the railways and the canals with a view to enabling the canals to achieve their utmost utility in the nation's scheme of transport was made at the annual meeting of the Mansion House Association on Transport on Friday, February 19. The meeting adopted a resolution "that this subject should receive the serious consideration of the Minister of Transport, the railway companies and canal companies as early as practicable, with a view to enabling the railway-owned canals and other British waterways to be operated as a useful component of the national scheme of transport, as pointed out by the Royal Commission on Transport in their Final Report in 1930."

The annual report for 1931 of the National Institute of Industrial Psychology, which was founded 11 years ago, describes 32 investigations carried out in factories, shops and offices, covering a very wide range of industries and trades, and dealing with problems that arise in almost every phase of management, organisation, distribution, and detail of factory procedure. A notable feature of this work of the Institute is that it benefits alike the employer and the employee—the employer by increased output and reduced costs, the employee by increased earnings, better working environment and lessened fatigue, boredom, irritation, etc. The Institute appeals for increased membership and for contributions towards research and the assistance of cases that cannot afford the cost of vocational guidance.

Wills.

Newton, Israel, of Bradford, engineer and boilermaker £5,920

Schofield, J. E., of Burton-on-Trent, at one time manager of Messrs. Thornewill & Wareham, the New Street Ironworks, Burton, and afterwards with Messrs. Markham & Company, Limited, engineers, of Chesterfield ... £6,489

Contracts Open.

Cairo, March 21.—Two-ton travelling crane, for the Egyptian Ministry of Public Works. The Department of Overseas Trade. (Reference A.X. 11,272.)

Dundee, March 7.—4,000 yds. of 4-in. and 2,000 yds. of 6-in. int. dia. cast-iron pipes, or, alternatively, spun and concrete lined, for the Corporation. Mr. G. Baxter, manager, 93, Commercial Street, Dundee.

Ottawa.—Diesel or semi-Diesel engines, for a local firm. The Department of Overseas Trade. (Reference G.X. 11,199.)

Persia, March 20.—Iron bridge across the Chalus River, Mazanderan, for the Department of Roads and Communications. The Department of Overseas Trade. (Reference G.X. 11,201.)

Company Reports.

Delta Metal Company, Limited.—Dividend of 12½ per cent. for the year.

Petters, Limited.—Interim dividend on the 7½ per cent. cumulative preference shares for the half-year to September 30, 1931.

Clarke, Chapman & Company, Limited.—Net profit, £25,298; depreciation, £6,669; brought in, £24,065; final dividend of 2½ per cent. on the ordinary shares, making 5 per cent. for the year; carried forward, £13,635.

Vickers, Limited.—Final dividends for the half-year ended December 31 of 2½ per cent. on the preferred 5 per cent. stock, 2½ per cent. on the 5 per cent. preference shares (both less tax) and 2½ per cent. on the cumulative preference shares (tax free).

Midland Electric Manufacturing Company, Limited.—Net profit, £38,946; provision for depreciation in market value of investments, £7,076; brought in, £19,123; dividend of 10 per cent. on the ordinary shares, £8,437; bonus of 12½ per cent. on the ordinary shares, £10,547; to reserve, £10,000; carried forward, £17,790.

Obituary.

Colonel Oliver Carleton Armstrong died in London on Thursday, February 18, at the age of 72. Colonel Armstrong was chairman of the Albion Turbine Company, Limited, Messrs. Greenwood & Batley, Limited, and the Manganese Bronze & Brass Company, Limited, and was a member of the Council of the Federation of British Industries.

Mr. S. Calvert has died at his home at Grindleford. Mr. Calvert was, until recently, representative for Yorkshire and Lancashire of Messrs. Andrews Toledo, Limited, but had subsequently joined the affiliated firms of Potts & Brown, Limited, Stand Steelworks, Sheffield, and Camm, Bagshaw & Company, Queen's Road Works, Sheffield, in a similar capacity.

Iron-Manganese-Carbon Alloys.—Technical Publication No. 467, on "The Equilibrium Diagram of Iron-Manganese-Carbon Alloys of Commercial Purity," issued by the American Institute of Mining and Metallurgical Engineers, states that a series of iron-carbon-manganese alloys of selected composition, up to 1.5 per cent. carbon and 15 per cent. manganese, has been studied as to constitution after equilibrium had been established at a variety of temperatures. The data from this investigation of alloys of commercial purity have been assembled in the form of a solid three-component diagram. Care was exercised to insure equilibrium, which is in general realised only after long periods of time at temperature. The unusually long intervals of heating employed in this study in order to approach equilibrium must clearly produce results at variance with many of those heretofore reported. It is believed that all such discrepancies have to do with the failure of ordinary intervals of time to bring about equilibrium conditions.

Book Review.

Foundry Work and Metallurgy, edited by R. T. Rolfe, F.I.C. Vols. I and II. Published by Sir Isaac Pitman & Sons, Limited, Parker Street, Kingsway, W.C.2. Price, each volume, 6s. net.

The contents of these books were first issued as a periodical publication, and when reviewing the first number we said that we would reserve our judgment until more matter was available. As six sections are contained in the first two volumes, it is now possible to form an opinion on the whole series, which, apparently, will be comprised in six books. On the whole, we are very well satisfied that balance is being splendidly achieved. By that we mean that it affords a person connected with the foundry industry a working knowledge of all other sections, whilst covering his own particular job to a reasonable standard of advancement.

Vol. I has patternmaking as its first section, and although covered in a matter of 60 pages, we doubt, that with the exception of the subject of pattern for gearing, whether any text-book is as up to date or more useful. The second section, moulding and coremaking, written by Mr. J. Laing, foundry superintendent to Messrs. W. H. Allen, Sons & Company, Limited, is probably the most difficult of all to assemble, as foundries vary so in character. Obviously, the author is a born teacher, and, as a result, an excellent text-book for an apprentice has been produced.

Mr. A. S. Beech is responsible for the chapter on machine moulding, and the book here takes on another character. The teacher has given place to the enthusiast, and a real knowledge of mondial foundry practice is evinced. The best portion of this section is that dealing with the manufacture of pattern plates, for herein is information which is not too well known or appreciated by the industry.

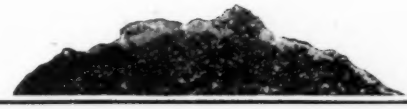
Vol. II section IV, is again due to Mr. Laing's treats of moulding sands, but this subject is in a state of flux at the moment and in a few years' time will certainly warrant a text-book to itself. Especially is this true of sand testing, because since the appearance of this book (January 29) there has been published the "needle" method of ascertaining hardness and density of ramming. Modern apparatus is well shown and clearly illustrated.

Sections V and VI, metallurgy, both ferrous and non-ferrous have been written by the Editor, Mr. R. T. Rolfe. The one dealing with iron and steel we consider to be excellent, but that devoted to non-ferrous is perhaps a little too theoretical in places for most foundrymen. We base this criticism on assuming that the book is being studied by an intelligent patternmaker. He would be able to understand section VI, but only to "follow" its predecessor in its later stages. The volumes are excellently presented and illustrated, except for a few of the pictures in section III, which are a little "smudgy" in our copy. Finally, we recommend this work as exhibiting every indication when completed of being an excellent treatise on modern foundry practice.

Catalogue Received.

Cast-Iron Amelioration.—Messrs. Beecroft & Partners, Limited, Retort Works, Mappin Street, Sheffield, have utilised a 4-page pamphlet to announce their placing on the market of a material for the treatment of grey iron with the object of ameliorating its physical properties. The material has been given the trade name of "Inokulite."

When milling aluminium the use of paraffin oil as a coolant will give a good finish and preserve the cutter. Dry-cutting will not give so good a finish and is hard on the cutter.



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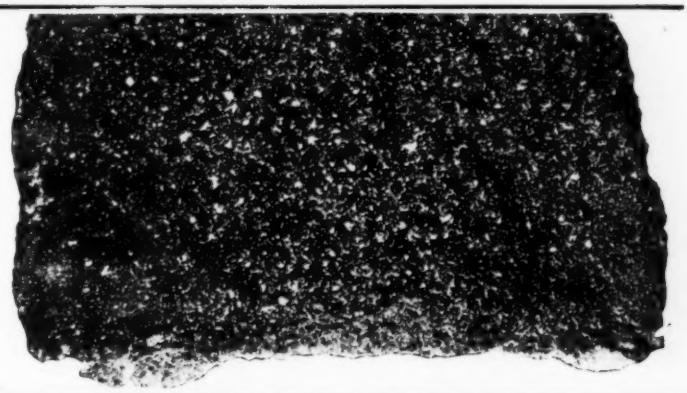

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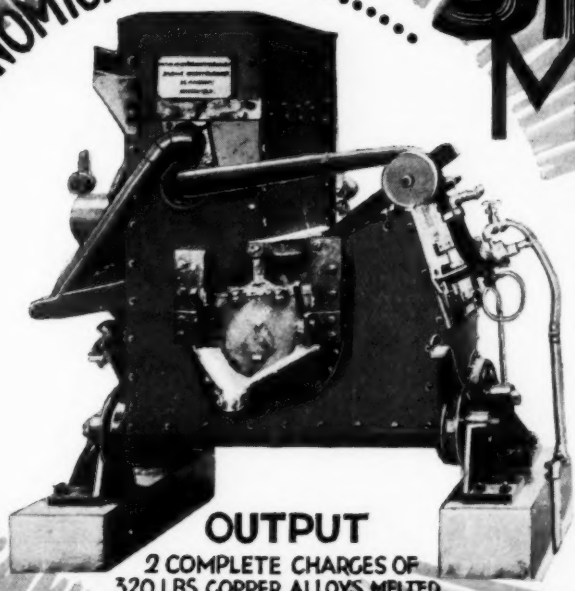

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Raw Material Markets.

The iron and steel trades have yet to feel the effect of the 10 per cent. tariff, but it is thought that more adequate protection will have to be provided. Importers brought in many ships in time to evade the tax, but the total tonnage of iron and steel goods was not very large. The home demand for pig-iron is limited, and only small parcels are being bought. The market for semi-finished steel is very slack. There has been a slight improvement in business in finished steel, but exports are still hampered by foreign exchange restrictions.

Pig-Iron.

MIDDLESBROUGH.—Little business is being done with consumers in this district, and only the strict curtailment of output prevents an increase in stocks. Deliveries of pig-iron to the general foundries are greatly in arrears, as the latter find orders very scarce. Nearly all business is being transacted directly between producer and consumer. Improved shipments are now being made from the Tees, and the volume of current inquiries generally is much above January's level. Prices continue at the minimum level, as follow:—No. 3 Cleveland G.M.B., 58s. 6d.; No. 1 foundry, 61s.; No. 4 foundry, 57s. 6d.; No. 4 forge iron, 57s. per ton.

The East Coast hematite trade remains in a very unsatisfactory position. Two West Coast furnaces have been damped down, but stocks of unsold iron are too large for the market to feel any stiffening influence. Merchants continue to cut prices in an endeavour to secure a share of the limited amount of business passing. East Coast mixed numbers are at 63s. 6d. per ton and No. 1 quality at 64s. In the West Coast market the number of inquiries circulating has shown improvement, but no business of note has so far resulted. Two Barrow furnaces have been put out of action, as mentioned above, but the limited supply remains ample for the even more limited demand. Bessemer mixed numbers are steady at 66s. per ton at works.

LANCASHIRE.—Sales to consumers in this district are irregular, and the general position shows no improvement. The majority of current contracts are due to run out soon, and a resumption of hand-to-mouth buying is feared. Prices remain unchanged, with Midland foundry makes offered for delivery to users in the Manchester price zone at 67s. per ton, North-East Coast at 67s., Northamptonshire at 65s. 6d., Derbyshire forge iron at 62s., Scottish pig-iron at about 87s. and West Coast hematite at 81s. Indian brands are quoted at about 77s. 6d.

MIDLANDS.—The pig-iron market is experiencing a slight decline, and the demand has shrunk considerably. Despatches from the furnaces are considerably less than they were a week ago. For delivery to Birmingham and Black Country stations, producers continue to quote 62s. 6d. for Northants No. 3 and 66s. for Derbyshire, North Staffordshire and Lincolnshire No. 3.

SCOTLAND.—Consumption of iron remains at a low ebb, and trade shows no sign of improvement. No. 3 Scottish foundry remains at 69s. 6d. per ton, with 2s. 6d. extra for No. 1. No. 3 Cleveland iron is quoted at 58s. 6d. per ton at Grangemouth, with other English makes at about 57s. per ton.

Coke.

The coke market in the Midlands remains steady, and prices are unaltered. Best Durham coke is quoted at 37s. 6d. per ton and upwards, with secondary qualities at about 35s. Welsh coke continues to vary in price according to quality, present quotations being from 30s. up to 45s.

Steel.

More orders for finished steel are reported in one or two instances, but the general level of employment at the steelworks remains low. Inactivity also rules in the semi-finished steel market. Little business is being done in Continental material, and the home works, though receiving only a limited number of orders, are able to maintain prices. Stocks of semis held by consumers are still very heavy.

Scrap.

Quiet conditions prevail in the Cleveland scrap-iron and steel market, and consumers are holding back. Heavy cast iron is offered at 42s. 6d. per ton, machinery quality, broken into handy sizes, at 45s. and light metal at 37s. 6d. A similar position rules in the Midlands market, where prices are inclined to weaken. Heavy machinery scrap in cupola sizes is offered at 47s. 6d. to 50s. per ton, with good heavy metal at 42s. 6d. to 45s. and clean light metal at 40s., all delivered. Only a few small sales of a miscellaneous character are reported from the Welsh and Scottish markets.

Metals.

Copper.—The London market has weakened considerably, owing to continued selling by outside smelters, whose quotation has fallen to 5¾ cents c.i.f.; this is far below the Official Exporters' price. The market shows no sign of strengthening, there being no improvement in the position of the consuming industries on either side of the Atlantic. In the meantime, various rumours have been current as to the probable future of the Exporters' Association, whose members have been conferring together for some time. It is reported that a complete cessation of production is under consideration. Many of the low-cost producers, on the other hand, are in favour of abandoning all restrictions and leaving the market to take its course.

Closing quotations :—

Cash.—Thursday, £35 5s. to £35 7s. 6d.; Friday, £33 7s. 6d. to £33 8s. 9d.; Monday, £33 15s. to £33 16s. 3d.; Tuesday, £32 6s. 3d. to £32 7s. 6d.; Wednesday, £33 2s. 6d. to £33 5s.

Three Months.—Thursday, £35 7s. 6d. to £35 10s.; Friday, £33 10s. to £33 12s. 6d.; Monday, £34 2s. 6d. to £34 5s.; Tuesday, £32 15s. to £32 17s. 6d.; Wednesday, £33 12s. 6d. to £33 15s.

Tin.—The price of standard tin fell in conjunction with the improvement in sterling. Market feeling was also unfavourably moved by the continued low level of consumption in the U.S.A., where the tinplate mills are only working at 40 per cent. of capacity. The announcement of Mr. Henry Ford's scheme for considerably increasing his car output was a "bull" point, but, at the present moment, the extra supplies of raw material necessitated have not been called for.

Official closing prices :—

Cash.—Thursday, £139 to £139 2s. 6d.; Friday, £137 15s. to £138; Monday, £138 10s. to £138 12s. 6d.; Tuesday, £137 15s. to £137 17s. 6d.; Wednesday, £138 15s. to £139.

Three Months.—Thursday, £141 7s. 6d. to £141 10s.; Friday, £140 2s. 6d. to £140 7s. 6d.; Monday, £140 15s. to £141; Tuesday, £140 to £140 2s. 6d.; Wednesday, £141 to £141 5s.

Spelter.—The market has gradually weakened, Monday's quotation of £13 marking the lowest level reached so far this year. There has been no improvement in consumption, and offers are considerably in excess of the demand. The fact that a premium was asked last week for Empire metal has caused considerable comment, Earl Winterton urging in the Commons that spelter should be exempted from the 10 per cent. duty. He alleged that, in view of the fact that nearly all Empire-produced spelter was controlled by one selling organisation, the British consumer was particularly liable to exploitation. The matter is to be investigated by the Advisory Committee.

Daily fluctuations :—

Ordinary. — Thursday, £13 5s.; Friday, £13 7s. 6d.; Monday, £13; Tuesday, £13 1s. 3d.; Wednesday, £13 7s. 6d.

Lead.—The preceding remarks apply equally to Empire lead, which has also been increased in price. Consumers seem to be well covered and are displaying little interest in the market. On Tuesday, soft foreign fell to £12 8s. 9d., the low record so far for 1932, and signs of recovery are not yet apparent.

The week's prices have been :—

Soft Foreign (Prompt).—Thursday, £14 5s.; Friday, £13 17s. 6d.; Monday, £13 10s.; Tuesday, £12 8s. 9d.; Wednesday, £12 11s. 3d.

Foundry Selling Practice.

(*Continued from page* 146.)

dealt with at once is recorded first and sent back to the person concerned.

It will thus be seen that there is a systematised stream of correspondence and information passing into and out of the sales records department, and that in the smallest possible space is maintained a history of transactions with each individual firm.

Naturally, a difficult and continuous labour of this kind would not be undertaken unless the advantages derived from it were such as to warrant it. Some of these advantages have been detailed already in the course of this article. However, the first result of a sales records system is that it begins to be used by all sorts of people not directly connected with the sales department. The publicity manager uses it for mailing and circularising lists. The accountant uses it to see if any report as to a firm's financial standing has been made by a representative. Production managers use it to refresh their memories as to a customer's requirements, or to familiarise themselves with what has happened previously, before replying to letters of an intricate character. Delivery managers use it, to make sure what promises the representatives made when quoting or taking the orders. In short, the ease with which all manner of references can be made make the sales records popular with the entire management, from directors downwards, and save hours of time in hunting for past files.

[We are very familiar with this system, and would suggest that provision should be made for six letters in the "Man to see" section. Thus in the "Remarks" column it would be recorded "Saw B." A further improvement can be effected by providing each representative with cards on which he will record (1) the name of the firm, (2) its address, (3) the department of his firm on behalf of which the call is made, (4) the date, (5) four or five lines for a report, (6) representative's name, (7) base from which he operates and (8) expenses specially incurred. These cards are extracted in a similar manner to that described in the article, but where a report indicates likely business at the end of a certain period they are filed in a "reminder" cabinet under a suitable date.—Editor.]

(*To be continued.*)

The Effect of Various Elements on the Quasi-isotropic State and the Sensitiveness to Section Thickness of Cast Iron.

(*Concluded from page* 147.)

light sections, whereas the pearlitic carbide is decomposed to a lesser degree. Further, the pearlite is refined, and, with increasing nickel content, transformed into sorbite and troostite. Thus, nickel markedly improves the quasi-isotropic state of cast iron. This effect can be raised by decreasing the silicon content. As phosphorus also plays a part, it is advisable, with respect to the economical side, to determine the necessary nickel content for a given iron by preliminary experiments.

Effect of Chromium.

The following two irons were tested:—(1) T.C., 2.60; Si, 2.13; Mn, 0.12; P, 0.045; S, 0.013; and Cr, 0.32 per cent.; and (2) T.C., 2.40; Si, 2.12; Mn, 0.05; P, 0.048; S, 0.007; and Cr, 0.60 per cent. Fig. 5 shows that chromium increases hardness and combined carbon content. However, the sensitiveness to wall thickness is not affected, as the wall-thickness lines run parallel to one another. Therefore, in the percentages given, chromium can be added to cast iron without impairing the beneficial effect of nickel, resulting in a marked increase in strength.

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Stand up to the exacting Requirements of the Modern Foundry

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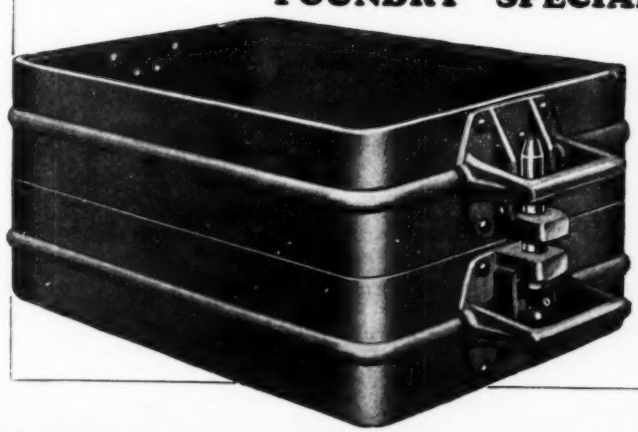

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WEEKLY PRICE CURRENT.

COPPER.

	£ s. d.
Standard cash	33 2 6
Three months	33 12 6
Electrolytic	37 5 0
Tough	34 15 0
Best selected	35 0 0
Sheets	68 0 0
India	44 0 0
Wire bars	37 15 0
Do., April	37 12 6
Do., May	37 10 0
Ingot bars	37 15 0
H.C. wire rods	40 10 0
Off. av. cash, Feb.	36 19 8½
Do., 3 mths., Feb.	36 14 2½
Do., Stlmnt., Feb.	36 19 3½
Do., Electro, Feb.	41 15 11½
Do., B.S., Feb.	40 10 0
Do., wire bars, Feb.	42 4 3½
Solid drawn tubes	10½d.
Brazed tubes	10½d.
Wire	7d.

BRASS.

Solid drawn tubes	9½d.
Brazed tubes	11½d.
Rods, drawn	8½d.
Rods, extd. or rlld.	5d.
Sheets to 10 w.g.	8d.
Wire	8d.
Rolled metal	7½d.
Yellow metal rods	5d.
Do. 4 × 4 Squares	6d.
Do. 4 × 3 Sheets	6d.

TIN.

	£ s. d.
Standard cash	138 15 0
Three months	141 0 0
English	140 0 0
Bars	141 0 0
Straits	140 17 6
Australian	139 5 0
Eastern	143 15 0
Banca (nom.)	149 15 0
Off. av. cash, Feb.	139 4 7½
Do., 3 mths., Feb.	141 17 2½
Do., Sttlmt., Feb.	139 4 6½

SPELTER.

	£ s. d.
Ordinary	13 7 6
Remelted	11 15 0
Hard	10 10 0
Electro 99.9	15 10 0
English	13 17 6
India	12 5 0
Zinc dust	23 0 0
Zinc ashes	3 7 6
Off. aver., Feb.	14 1 7½
Aver. spot, Feb.	13 17 5½

LEAD.

	£ s. d.
Soft foreign ppt.	12 11 3
English	14 15 0
Off. average, Feb.	14 11 3½
Average spot, Feb.	14 11 2½

ZINC SHEETS, &c.

	£ s. d.
Zinc sheets, English	24 10 0
Do., V.M. ex-whf.	23 10 0
Rods	29 0 0
Boiler plates	—
Battery plates	—

ANTIMONY.

	£ s. d.
Special brand Eng.	40 0 0
Chinese (nom.)	31 10 0
Crude	22 0 0

QUICKSILVER.

	£ s. d.
Quicksilver (nom.)	18 17 6

FERRO-ALLOYS AND STEEL-MAKING METALS.

Ferro-silicon—	
25%	7 2 6
45/50%	12 0 0
75%	16 10 0
Ferro-vanadium—	
35/50%	12/8 lb. Va.
Ferro-molybdenum—	
70/75% c. free, 4/2, plus 55%, per lb. of Mo.	
Ferro-titanium—	
23/25% carbon-free	1/- lb.
Ferro-phosphorus, 20/25%	£22 10 0
Ferro-tungsten—	
80/85%	1/8½ lb. plus 20%
Tungsten metal powder—	
98/99%	1/11½ lb. plus 20%
Ferro-chrome—	
2/4% car.	£34 12 6
4/6% car.	£25 0 0
6/8% car.	£23 17 6
8/10% car.	£23 0 0
Ferro-chrome—	
Max. 2% car.	£39 10 0
Max. 1% car.	£44 0 0
Max. 0.70% car.	£51 0 0
70%, carbon-free	1/2 lb.
Nickel—80/99.5%	£240 to £245
Ferro-cobalt	10/- lb.
Aluminium 98/99%	£95 0 0
Metallic chromium—	
96/98%	3/- lb.
Ferro-manganese (net)—	
76/80% loose	£10 15 0 to £11 5 0
76/80% packed	£11 15 0 to £12 5 0
76/80% export	(nom.) £ 9 0 0
Metallic manganese—	
94/96% carbon-free	1/6 lb.

Per ton unless otherwise stated.

HIGH-SPEED TOOL STEEL.

Finished bars, 14% tungsten	2s. 0d.
Finished bars, 18% tungsten	2s. 9d.

Per lb. net, d/d buyers' works.

Extras—	
Rounds and squares, 3 in. and over	4d. lb.
Rounds and squares, under ½ in. to ¼ in.	3d. lb.
Do., under ¼ in. to $\frac{1}{16}$ in.	1/- lb.
Flats, ½ in. × ¼ in. to under 1 in. × ⅛ in.	3d. lb.
Do., under ½ in. × ¼ in.	1/- lb.
Bevels of approved sizes and sections	6d. lb.

Bars cut to length, 10% extra.

SCRAP.

South Wales—	£ s. d.	£ s. d.
Heavy steel	2 5 0	to 2 6 0
Bundled steel and shrngs.	1 17 0	to 1 18 0
Mixed iron and steel	2 0 0	to 2 1 0
Heavy cast iron	2 6 0	to 2 7 0
Good machinery for foundries	2 10 0	

Cleveland—		
Heavy steel	1 15 0	to 2 0 0
Steel turnings	1 12 6	
Cast-iron borings	1 6 0	
Heavy forge	2 15 0	
W.I. piling scrap	2 7 6	
Cast-iron scrap	2 2 6	to 2 5 0

Midlands—	
Light cast-iron scrap	2 0 0
Heavy wrought iron	2 12 6
Steel turnings, f.o.r.	1 2 6

Scotland—	
Heavy steel	2 0 0
Ordinary cast iron	2 8 6
Engineers' turnings	1 10 0
Cast-iron borings	1 11 6
Wrought-iron piling	2 5 0
Heavy machinery	2 15 0

London—Merchants' buying prices delivered yard.

Copper (clean)	30 0 0
Brass	22 0 0
Lead (less usual draft)	12 0 0
Tea lead	9 0 0
Zinc	6 15 0
New aluminium cuttings	62 0 0
Braziery copper	27 0 0
Gunmetal	26 0 0
Hollow pewter	90 0 0
Shaped black pewter	70 0 0

PIG-IRON.

(f.o.t. unless otherwise stated.)

N.E. Coast—	
Foundry No. 1	61/-
Foundry No. 3	58/6
Foundry No. 4	57/6
Forge No. 4	57/-
Hematite No. 1	64/-
Hematite M/Nos.	63/6
N.W. Coast—	
Hem. M/Nos. d/d Glas.	73/-
„ d/d Birm.	84/6
Malleable iron d/d Birm.	117/6
Midlands—	
Staffs common*	—
„ No. 4 forge*	61/-
„ No. 3 fdry.*	66/-
Shrops basic	—
„ Cold blast, ord.	—
„ „ roll iron	—
Northants forge*	57/6
„ fdry. No. 3*	62/6
„ fdry. No. 1*	65/6
Derbyshire forge*	61/-
„ fdry. No. 3*	66/-
„ fdry. No. 1*	69/-
„ basic*	—

*d/d Black Country dist.

Scotland—	
Foundry No. 1	72/-
„ No. 3	69/6
Hem. M/Nos. d/d	68/6
Sheffield (d/d district)—	
Derby forge	58/6
„ fdry. No. 3	63/6
Lincs forge	—
„ fdry. No. 3	63/6
E.C. hematite	74/6
W.C. hematite	83/6
Lancashire (d/d eq. Man.)—	
Derby forge	62/-
„ fdry. No. 3	67/-
Staffs fdry. No. 3	67/-
Northants fdry. No. 3	65/6
Cleveland fdry. No. 3	67/-
Dalzell, No. 3 (special)	102/6 to 105/-
Glengarnock, No. 3	87/-
Clyde, No. 3	87/-
Monkland, No. 3	87/-
Summerlee, No. 3	87/-
Eglinton, No. 3	87/-
Gartsherrie, No. 3	87/-
Shotts, No. 3	87/-

FINISHED IRON AND STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

Iron—	£ s. d.	£ s. d.
Bars (cr.)	9 15 0	to 10 0 0
Nut and bolt iron	8 7 6	to 8 10 0
Hoops	10 10 0	to 12 0 0
Marked bars (Staffs) f.o.t.	12 0 0	
Gas strip	10 10 0	to 12 0 0
Bolts and nuts, ¾ in. × 4 in.	12 2 6	

Steel—		
Plates, ship, etc.	8 15 0	to 8 17 6
Boiler plts.	8 12 6	to 9 12 6
Chequer plts.	10 7 6	
Angles	8 7 6	
Tees	9 7 6	
Joists	8 15 0	
Rounds and squares, 3 in. to 5½ in.	9 7 6	
Rounds under 3 in. to ¾ in. (Untested)	6 15 0	& up.
Flats—8 in. wide and over	8 12 6	
„ under 8 in. and over 5 in.	8 17 6	
Rails, heavy	8 5 0	to 8 10 0
Fishplates	12 0 0	
Hoops (Staffs)	9 10 0	
Black sheets, 24g.	8 0 0	to 8 10 0
Galv. cor. shts.	9 10 0	to 10 0 0
Galv. flat shts.	10 0 0	to 11 0 0
Galv. fencing wire, 8g. plain	12 10 0	
Billets, soft	5 7 6	to 5 12 6
Billets, hard	6 12 6	
Sheet bars	4 15 0	to 5 5 0
Tin bars	4 15 0	

PHOSPHOR BRONZE.

	Per lb. basis.
Strip	11d.
Sheet to 10 w.g.	12d.
Wire	12½d.
Rods	11½d.
Tubes	16½d.
Castings	12½d.

Delivery 3 cwt. free.
10% phos. cop. £30 above B.S.
15% phos. cop. £35 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. Clifford & Son, Limited.

NICKEL SILVER, &c.

	Per lb.
Ingots for raising	7d. to 1/1
Rolled—	
To 9 in. wide	1/1 to 1/7
To 12 in. wide	1/1½ to 1/7½
To 15 in. wide	1/1½ to 1/7½
To 18 in. wide	1/2 to 1/8
To 21 in. wide	1/2½ to 1/8½
To 25 in. wide	1/3 to 1/9
Ingots for spoons and forks	7d. to 1/3½
Ingots rolled to spoon size	10d. to 1/6½
Wire round—	
to 10g.	1/4½ to 1/11½

with extras according to gauge.
Special 5ths quality turning rods in straight lengths, 1/3½ upwards.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

	Dols.
No. 2 foundry, Phila.	15.64
No. 2 foundry, Valley	15.00
No. 2 foundry, Birm.	11.00
Basic	16.39
Bessemer	17.39
Malleable	17.39
Grey forge	16.89
Ferro-mang. 80%	75.00
O.-h. rails, h'y, at mill	43.00
Billets	27.00
Sheet bars	26.00
Wire rods	37.00
	Cents.
Iron bars, Phila.	2.11
Steel bars	1.50
Tank plates	1.50
Beams, etc.	1.50
Skelp, grooved steel	1.50
Skelp, sheared steel	1.50
Steel hoops	1.65
Sheets, black, No. 24	2.15
Sheets, galv., No. 24	2.75
Wire nails	1.95
Plain wire	2.20
Barbed wire, galv.	2.60
Tinplates, 100-lb. box	$4.75

COKE (at ovens).

Welsh foundry	22/6 to 25/-
„ furnace	17/6 to 18/6
Durham and Northumberland—	
„ foundry	14/6 to 15/-
„ furnace	14/- to 14/6
Midlands, foundry	—
„ furnace	—

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. cokes	20×14 per box	16/-
„	28×20 „	32/-
„	20×10 „	—
„	18¾×14 „	—
C.W.	20×14 „	—
„	28×20 „	—
„	20×10 „	—
„	18¾×14 „	—

SWEDISH CHARCOAL IRON & STEEL.

Pig-iron	£6 0 0 to £7 0 0
Bars, hammered, basis	£16 10 0 to £17 0 0
Bars and nail-rods, rolled, basis	£15 17 6 to £16 5 0
Blooms	£10 0 0 to £12 0 0
Keg steel	£32 0 0 to £33 0 0
Faggot steel	£18 0 0 to £23 0 0
Bars and rods dead soft, st'l	£10 0 0 to £12 0 0

All per English ton, f.o.b. Gothenburg.
[Subject to an exchange basis of Kr. 18.16 to £1.]

XUM

TUBES AND FITTINGS.

Current Discounts.

	Tubes.	*Fittings.*
Gas	65%	57½%
Water ..	61½%	52½%
Steam ..	57½%	47½%

DAILY FLUCTUATIONS.

Standard Copper (cash).

		£	s.	d.		
Feb.	25 ..	35	5	0	dec.	8/9
,,	26 ..	33	7	6	,,	37/6
,,	29 ..	33	15	0	inc.	7/6
Mar.	1 ..	32	6	3	dec.	28/9
,,	2 ..	33	2	6	inc.	16/3

Electrolytic Copper.

		£	s.	d.		
Feb.	25 ..	39	10	0	dec.	20/-
,,	26 ..	38	10	0	,,	20/-
,,	29 ..	38	5	0	,,	5/-
Mar.	1 ..	36	10	0	,,	35/-
,,	2 ..	37	5	0	inc.	15-

Standard Tin (cash).

		£	s.	d.		
Feb.	25 ..	139	0	0	dec.	5/-
,,	26 ..	137	15	0	,,	25/-
,,	29 ..	138	10	0	inc.	15/-
Mar.	1 ..	137	15	0	dec.	15/-
,,	2 ..	138	15	0	inc.	20/-

Tin (English ingots).

		£	s.	d.		
Feb.	25 ..	140	5	0	dec.	5/-
,,	26 ..	139	5	0	,,	20/-
,,	29 ..	139	15	0	inc.	10/-
Mar.	1 ..	139	0	0	dec.	15/-
,,	2 ..	140	0	0	inc.	20/-

Zinc Sheets (English).

		£	s.	d.		
Feb.	25 ..	24	10	0	No	change
,,	26 ..	24	10	0	,,	,,
,,	29 ..	24	10	0	,,	,,
Mar.	1 ..	24	10	0	,,	,,
,,	2 ..	24	10	0	,,	,,

Spelter (ordinary).

		£	s.	d.		
Feb.	25 ..	13	5	0	No	change
,,	26 ..	13	7	6	inc.	2/6
,,	29 ..	13	0	0	dec.	7/6
Mar.	1 ..	13	1	3	inc.	1/3
,,	2 ..	13	7	6	,,	6/3

Lead (English).

		£	s.	d.		
Feb.	25 ..	16	0	0	inc.	5/-
,,	26 ..	15	15	0	dec.	5/-
,,	29 ..	15	0	0	,,	15/-
Mar.	1 ..	14	5	0	,,	15/-
,,	2 ..	14	15	0	inc.	10/-

AVERAGE MONTHLY PRICES OF IRON HOOPS.

Year.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly average.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1896	6 2 6	6 2 6	6 2 6	6 2 6	6 2 6	6 2 6	6 2 6	6 2 6	6 2 6	6 2 6	6 5 0	6 10 0	6 3 0
1897	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 8
1898	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 10 0	6 15 0	6 15 0	7 0 0	6 11 6
1899	7 0 0	7 0 0	7 0 0	7 0 0	7 12 6	10 12 6	8 12 6	8 12 6	8 12 6	9 2 6	9 7 6	9 17 6	8 2 9
1900	9 17 6	10 7 6	10 7 6	10 7 0	10 12 6	7 12 6	10 12 6	10 12 6	10 12 6	9 17 6	9 2 6	9 2 6	10 3 8
1901	9 2 6	8 2 6	8 2 6	7 12 6	7 12 6	7 12 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 11 2
1902	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6
1903	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 0
1904	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6	7 2 6
1905	6 17 6	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 2 6	7 2 6	7 2 6	7 7 6	7 0 0	7 7 6	7 2 9½
1906	7 10 0	7 17 6	7 15 0	7 15 0	7 15 0	7 15 0	7 15 0	7 15 0	7 15 0	7 15 0	8 7 6	7 15 0	7 15 1½
1907	8 7 6	8 7 6	8 7 6	8 7 0	8 7 6	8 7 6	8 10 0	8 10 0	8 10 0	8 5 0	8 5 0	8 0 0	8 7 1
1908	8 0 0	7 10 0	7 10 0	7 10 6	7 10 0	7 10 0	7 10 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 6 8
1909	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0
1910	7 1 10½	7 6 3	7 7 6	7 7 0	7 7 6	7 7 6	7 7 6	7 7 6	7 7 6	7 6 3	7 5 0	7 5 0	7 6 5
1911	7 5 0	7 5 0	7 5 0	7 5 6	7 5 0	7 5 0	7 5 0	7 5 0	7 5 0	7 8 9	7 10 0	7 10 0	7 6 2½
1912	7 12 6	7 12 6	7 12 6	7 15 0	7 15 0	8 2 6	8 2 6	8 2 6	8 12 6	8 12 6	8 12 6	8 15 0	8 2 3½
1913	8 17 6	8 17 6	8 17 6	8 17 0	8 17 6	8 17 6	8 17 6	8 7 6	8 7 6	8 7 6	8 7 6	7 17 6	8 12 6
1914	7 17 6	7 17 6	7 17 6	7 13 9	7 12 6	7 12 6	7 12 6	9 2 6	9 2 6	9 2 6	9 2 6	9 2 6	8 6 4½
1915	9 3 6	9 18 1	10 7 6	10 16 6	10 17 6	13 2 6	13 2 6	13 2 6	13 7 6	14 2 6	15 2 6	15 18 6	12 10 1
1916	17 2 6	17 2 6	17 2 6	17 6 3	17 7 6	17 7 6	17 7 6	17 7 6	17 7 6	17 7 6	17 7 6	17 7 6	17 6 1
1917	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6
1918	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6	17 2 6
1919	17 2 6	17 2 6	17 2 6	17 2 6	24 6 3	24 6 3	24 6 3	25 9 0	26 7 6	26 7 6	26 7 6	26 17 4	22 14 9
1920	28 0 0	28 12 6	33 15 0	35 5 0	35 15 10	38 17 6	38 17 6	38 17 6	38 17 6	38 17 6	36 17 6	36 17 6	35 14 9
1921	29 1 3	23 5 0	21 12 6	20 0 0	20 0 0	20 0 0	17 5 0	15 0 0	14 4 0	13 15 0	13 10 0	12 18 0	17 5 10
1922	16 5 0	15 13 9	14 0 0	14 0 0	14 0 0	14 0 0	14 0 0	14 0 0	14 0 0	14 0 0	14 0 0	14 0 0	13 4 6½
1923	14 0 0	15 0 0	15 0 0	15 0 0	15 6 0	15 0 0	15 0 0	15 0 0	15 0 0	15 0 0	14 16 0	14 15 0	14 18 3½
1924	14 15 0	14 15 0	14 15 0	14 15 0	14 15 0	14 13 9	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 12 4½
1925	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 C
1926	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0
1927	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	12 10 0	12 10 0	14 3 4
1928	12 10 0	12 7 6	12 0 0	11 13 6	11 15 0	11 12 6	11 10 0	11 10 0	11 10 0	11 10 0	11 10 0	11 10 0	11 14 10½
1929	11 10 0	11 10 0	11 10 0	11 10 0	11 9 0	11 5 0	11 5 0	11 5 0	11 5 0	11 2 0	11 0 0	11 0 0	11 5 11
1930	11 0 0	11 0 0	11 0 0	10 16 3	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0	10 16 4½
1931	10 15 0	10 15 0	10 15 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 11 3
1932	10 10 0	10 10 0	—	—	—	—	—	—	—	—	—	—	—

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EMPLOYMENT REGISTER.

Conducted by the Institute of British Foundrymen by courtesy of the proprietors of The Foundry Trade Journal.

Correspondence should be addressed to the General Secretary, Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, from whom full particulars can be obtained of this service.

Any employer wishing to communicate with a candidate should write to the General Secretary, quoting identification number.

20 YEARS' experience on electrical and general engineering castings, 2½ years as Foreman in light-castings trade. Thorough knowledge of moulding machines and continuous casting practice. Technically trained. (163)

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PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun, and on occasions—be it admitted—of naughtiness. Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice-Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception. Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea?

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